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ANOMALOUS ERUPTIONS IN TYPHOID FEVER.[1]

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The characteristic lenticular eruption in typhoid fever has been so well studied that there is little to be added to our knowledge of it; but, irrespective of the significant rose-spots, there are rashes which are comparatively rare, imperfectly understood, and become the cause of confusion and error. The two that I shall specially examine are a diffused erythema simulating scarlet fever and an eruption like that of measles. Let me take up the scarlatiniform eruption first and illustrate it by a few cases.

Case I.—Sarah V. (No. 2647), aged fourteen years, was admitted into the Pennsylvania Hospital on February 11, 1898. She was in the seventh day of typhoid fever; the temperature was 103.2°, the Widal reaction was positive. From the first the mottled look of the skin attracted attention; the characteristic rose-colored spots of typhoid soon became unusually profuse; they were seen on the abdomen, back, chest, and even on the face. The case did not prove a severe one. A remarkable feature was the appearance on the night of the twelfth day of the disease of a bright red erythematous eruption, readily affected by pressure and very generally diffused, but especially marked on the face and back. There were blotches of more vivid hue than others; there was no itching. No rise in temperature or abnormal state of the urine was observed in connection with the rash; the highest temperature attained was only 100.2°. No sore-throat existed, and the symptoms did not become aggravated by the occurrence of the eruption, which passed away by morning. The case went on uninterruptedly to recovery.

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[1] Paper presented to the Association of American Physicians at its May meeting, 1899.

A yet more striking illustration of the scarlatiniform rash, and one in which this lasted very much longer, was afforded by the next case.

Case II.—Katie F., a young woman, was admitted into the Pennsylvania Hospital on March 6, 1897, having been ill for about five days. She had been previously in good health, and had never had either measles or scarlet fever. On admission to the hospital her temperature was noted at 103°, but it soon rose to 105°; the urine showed a trace of albumin, and one finely granular cast was found. The skin was very fair, so that any spots could have been readily detected, but none were observable. The next day there appeared on the face and arms a bright red, erythematous rash, which lessened somewhat after sponging, and was not always equally distinct, seeming to come and go, though never wholly leaving. There was no rash of the kind on the body, but it was specially observed that pressure on the skin everywhere produced a red spot which only slowly faded. The temperature ranged between 103° and 104.2°. On the 9th great disturbance of respiration was perceived, the breathing fell to twelve in the minute, and was jerky and irregular, and the erythematous rash which had disappeared showed itself again on the face and arms, giving the patient the appearance of scarlet fever—an appearance which was increased by a redness of the tonsils and the pharynx, the latter being covered with tenacious mucus. She was very ill, but the temperature-range was not materially different; during the night it ranged from 103.2° to 104.6°, and she was very delirious.

On the 11th the rash was still visible, and still could be made to disappear temporarily on pressure. It was again noted that none was to be seen on the body, though it now showed itself on the back of both legs; around the elbow-joints it was much less marked than on the back of the hands and forearm. Few of the characteristic lenticular typhoid spots were discernible; there were two doubtful ones on the chest. The Widal test gave a positive reaction. The influence of cold sponging was very irregular. At one sponging the temperature fell as much as six degrees; at another, of similar length and thoroughness, but four-fifths of a degree. As the case advanced the urine contained rather more albumin, and red corpuscles and quantities of hyaline and pale granular casts were found. The patient died six day after admission into the hospital, near the end of the second week of typhoid fever, the rash being evident to the last. At the autopsy a great number of prominent and swollen solitary glands and Peyer's patches were seen, but none were ulcerated. The spleen was large and soft and weighed ten ounces. The lower surface was slightly mottled; the posterior portions of the lungs were congested; the kidneys were large, weighed seven and a half ounces; the substance was firm, the capsules adherent. The rash was not discernible on the surface of the body.

There are in this case some points for special study. First, the scarlatinal rash appearing in the first week and at a time in advance of the characteristic rose-spots. The rash was uniform, was not, as in the first case, preceded by mottling, was easily influenced by pressure, did not apparently modify the temperature, and persisted to the last. In its early appearance it was like a case described by Murchison,[1] in which a delicate scarlet rash all over the body preceded for two or three days the lenticular spots of enteric fever. The scarlatiniform rash may remain through the fever, though it rarely does so. Irrespective of its appearance in the first week, it may come on late in the disease, and I have known it to manifest itself even in convalescence (case of Thomas G., Pennsylvania Hospital, December, 1880) and to return in a relapse. Its character may be thus described: It is a uniform red rash, like scarlatina; it is seen all over the body, though not so in every instance. It is more distinct in some places than in others. It is easily influenced by pressure. It has its periods of greater or less intensity, of partial disappearance, of vivid return. It lasts generally a week or somewhat longer. It passes away without desquamation—at least I have never seen this happen. It does not perceptibly influence the course of the temperature. It is for the most part unconnected with sore-throat or with albuminuria. As regards albuminuria, I have observed this in some of the cases I met with, but it was a prior condition connected with the typhoid fever. With reference to sore-throat, this was in a mild form in Case II., and Jenner mentions an instance in which slight sore-throat was an accompaniment, and typhoid fever was mistaken for scarlet fever. Save under the exceptional circumstances of attending sore-throat and desquamation, there is no difficulty in determining the two diseases, or in diagnosticating that scarlet fever is not intercurrent in typhoid.

Rarer than the scarlatiniform eruption, and much more misleading, is an eruption like measles. This case may serve as an illustration:

Case III.—Richard G., aged twenty-eight years, was admitted on November 26, 1886, into the Pennslyvania Hospital on the eighth day of typhoid fever. The face was flushed, the temperature 103.4°; there was marked hebetude. The abdomen was tympanitic and its surface covered with a coarse, slightly papular eruption, not crescentically arranged and not disappearing on pressure; besides, there were a few rose-colored spots. In the course of the fever the eruption faded slowly and imperfectly, and was still perceptible when convalescence was reached. It retained its coarse appearance, and never showed itself on the limbs or thorax or the face. The notes speak of its similarity to the rash of typhus. There were also numerous sudamina. The temperature at one time reached 105°. The urine was free from albumin, though once a trace of albumin and a few hyaline casts were observed.

In this case the measly eruption was limited in its extent. It was much more diffused in the next case, which, moreover, afforded a good opportunity of studying the question of its association with any temperature changes.

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[1] Case XLV., Treatise on Continued Fevers.

CASE IV.—John McG., a soldier, aged nineteen years, was sent to the Pennsylvania Hospital on November 15, 1898, suffering with typhoid fever. He had been ill for two weeks, and there were many rose-spots on the chest and abdomen. The temperature was 104.6°, the face very flushed, the spleen much enlarged; the urine contained albumin as well as a few hyaline casts; the Widal test gave a positive reaction. Five days after admission an eruption closely resembling measles appeared on the chest, abdomen, back, and upper part of the thigh, and later, though much more sparsely, on the legs, and yet more sparsely on the arms. On the face there were not many; they showed themselves late, and were less distinctly measly in appearance; in the notes they are described as blotches. Nowhere was there a crescentic arrangement of the raised red spots, which, however, in many places coalesced, and did not disappear on pressure. They passed away in five days, without itching or desquamation, the blotches on the face first, those on the legs last. The eyes were slightly injected, but no catarrhal symptoms existed. There were many places on the chest and abdomen in which the rose-colored typhoid spots were perceptible near the measly rash. Much hebetude was observed while the rash lasted, but, as hebetude had been noticed from the time the patient was first seen, it could not be associated with the occurrence of the rash.

The appearance of the rash was not combined with any marked temperature changes. On the 18th the temperature ranged around 103°. On the 19th, the day preceding the eruption, the temperaure at 9.20 A.M. was 101.6°. It rose during the day to 103°, modified, however, by sponging. During the night it continued to rise, until by 9.30 A.M. of the 20th, the day the measly eruption appeared, it reached 103.8°. On that day the temperature slowly fell, except for occasional rises, whch were kept in check by sponging, until by 8 P.M. it had declined to 102.6°. During the night it continued to fall, the rises still being kept in check by sponging, until by 9.10 A.M. on the morning of the 21st it had reached 101°. During the 21st it went up slowly, passing to near 102° by 9.30 P.M., and continued to rise during the night until, by the 22d at 9.20 A.M., it had passed to 102.6°. During the 22d the line was gradually downward, with the exception of one decided rise at 4.10 P.M., when it reached 103.8°, this rise being promptly influenced by sponging. On the 23d the range of temperature was, on the whole, lower than on the 22d, the highest attained being 101.6° at 7.40 P.M., and the lowest reached being 100°. On the 24th the temperature again went up, and on one occasion, at 1.40 P.M., for a short time reached 103·6°. During the night it steadily fell, and on the 25th, the day of the disappearance of the eruption, it was 98.6° in the morning, though once in the day it reached 101.8°. These details of temperature are given that we may ascertain if the eruption exercised any influence on it. On the whole, the temperature showed only the zigzag which is common at this stage of typhoid fever, and did not appear to be influenced by the eruption. If any other inference were drawn it would be that the temperature was somewhat higher in the twenty-four hours preceding the eruption, and fell slowly on the day of its occurrence. The patient soon entered upon steady improvement, and was entirely convalescent sixteen days after the disappearance of the eruption.

The similarity of these cases of typhoid fever with measly eruption to typhus fever is very great, and, when we have cases in which the nervous symptoms are pronounced and enteric symptoms absent, it is very difficult to come to a conclusion, unless the malady has been seen from the beginning and the temperature has been studied from the beginning; for the measly rash common in typhus fever and very uncommon in typhoid has in both much the same appearance. How much alike typhoid with measly rash may be to typhus is proved by the following case:

Case V.—John O'R. (No. 2457), aged eighteen years, previously in excellent health, living in good surroundings and not known to have been exposed to any disease, was admitted on December 12, 1898, into the Pennsylvania Hospital with a fever of a low type, stated to be of eight days' duration and to have begun with epistaxis and vomiting. His face was flushed, he was delirious, the tongue was dry and brown, the pulse weak, the temperature 103.6°, the spleen large; albumin and granular and hyaline casts were found in the urine; rose-spots were seen on the abdomen; the Widal test was positive. He presented altogether the picture of a case of typhoid fever with marked prostration and cerebral symptoms. The delirium was the most striking feature, and in it he got out of bed and attempted to throw himself out of the window, but was fortunately caught. Two days after admission, and on the tenth day of the disease, he was covered from head to foot with a profuse eruption. On the face, hands, and feet it was as evident as on the rest of the body, and, though influenced, it did not disappear on pressure. It was composed of numerous spots of irregular form, very slightly elevated above the skin, and precisely like the measly eruption often seen in typhus. The similarity to this disease became now greater and greater, and was heightened by the absence of enteric symptoms and the occurrence on the left side of a true pneumonia of the base with rusty sputum—a form of pneumonia much more common in typhus than in typhoid. The eruption was so thick over the body that there was scarcely a pin-point free. It was not crescentically arranged; here and there it was petechial. Fearing that the case might, after all, be typhus, the patient was carefully isolated and then removed from the hospital, as a sorrowful experience of having had cases admitted into the Pennsylvania Hospital, some years ago, that proved to be typhus[1] and resulted in our having within its walls very many serious instances of the disease before we got rid of it, determined me to let the rest of the patients and the attendants run no risk. The similarity of typhus remained great to the end. The temperature, the day after he left the hospital, fell by crisis, as it often does in typhus fever; the eruption showed merely as brownish traces. Another Widal examination gave positive results, and the patient slowly recovered.

Looking back over the history, though the case is still not free from doubt, I believe it to have been one of typhoid fever, rendered uncertain chiefly on account of the peculiar measly eruption here under consideration.

Another error likely to arise is due to the occasional occurrence of true measles in typhoid fever. This intercurrence may be studied in the two cases now to be detailed.

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[1] "Researches on Typhus Fever." American Journal of the Medical Sciences, January, 1866.

Case VI.—Gerano L., an Italian, aged seventeen years, was ill with typhoid fever for a week when admitted into the Pennsylvania Hospital on January 17, 1898. Diarrhœa and tympany were absent, but the typhoid eruption on the chest and abdomen showed very clearly through his dusky skin. By the 26th of the month the morning temperature was 99°, but it rose in the evening to 102° and slightly beyond. On the 27th and 28th there were the same morning remissions and evening exacerbations to between 102° and 103°. On the 29th, the morning temperature being 99.6°, the conjunctiva was noticed to be injected, photophobia was complained of, there was some cough, and an eruption of measles showed itself. The temperature rose to 102.1°, and went on rising as the eruption spread over the body, until on the 30th it reached 105°. On the 31st it dropped to 102° and the catarrhal symptoms persisted. On February 1st the temperature became normal; the rash was fading. The boy was then transferred to the children's ward, which at that time contained a great many cases of measles, and where he convalesced.

Case VII.—Paul B., a soldier, aged twenty-one years, admitted to the Pennsylvania Hospital on September 20, 1898, with typhoid fever. By the 26th his temperature had touched normal, he was sitting up in bed, and hungry. On the 29th the thermometer marked the normal, or, at the highest, 99°. He was noticed to have coryza, injected eyes, headache, and cough. Soon the temperature began to rise, and on October 5th it was at 101°, and an eruption of measles appeared on the face. The next day the whole body was covered with measles. On the trunk the crescentic arrangement was noticeable; severe itching was complained of. It was ascertained from the patient by Dr. James C. Wilson, under whose care he then was, that he had never had measles, but had been exposed to it thirteen days before the catarrhal symptoms appeared, while riding to the hospital train in an ambulance with a case of measles. The Widal test, made while the measles existed, was negative, but there was a positive diazo reaction. The urine showed uric acid crystals, but neither albumin nor sugar. The temperature on the second day of the eruption fell to 99°, and subsequently was subnormal. Desquamation was noted on the fifth day. The recovery was a good one, except for a double phlegmasia dolens which protracted it.

When we contrast these cases of coexisting measles and typhoid fever with cases of typhoid fever in which a measly rash happens, we find striking differences. First, in the character of the eruption. This in true measles is coarser, more markedly papular, and has the well-known crescentic arrangement, which is not seen in typhoid fever. Secondly, there is itching and there is desquamation, which are also not observed in the typhoid fever rash. Moreover, the presence of the coryza and catarrhal symptoms is very significant in the intercurrent measles. But of greatest value and meaning is the temperature record. In the measly eruption of typhoid the eruption has no marked influence on the temperature, or greater variations are not met with than belong to the stage of the typhoid fever in which the measly eruption may occur. It is different, as is seen by studying the temperature in both of the cases just described, in intercurrent measles. The temperature here rises decidedly in the days immediately preceding the eruption, in the prodromal stage, exactly as in ordinary measles, and it goes on rising, or remains high, with the spreading eruption. This is quite unlike what happens in the measly eruption in typhoid fever. Where we are nearing convalescence, and the temperature has been ranging around the normal line, these temperature changes are of the greatest value in diagnosis. They are necessarily less so earlier and while the fever temperature of the enteric fever itself is still a pronounced one.

We have thus described a scarlatiniform eruption, a morbilliform eruption, and also spoken of the mottling of the skin. This mottling, as in typhus, is due to a subcuticular rash, and may remain as the only eruption, or precede or attend either of the other kinds. The interesting question now arises, Are all these really separate forms, or merely different expressions of the same pathological condition—in reality one affection? I believe they are one, for I have seen them combined in the same patient and apparently interchangeable. Here is a case in proof:

Case VIII.—Walter R. (No. 1684), a soldier, aged twenty-two years, brought from Camp Meade, was admitted into the Pennsylvania Hospital on September 20, 1898, with typhoid fever. When a child he had measles and scarlet fever. He has also had pneumonia and a previous attack of typhoid fever. The day of admission, and as nearly as could be ascertained the seventh of the disease, the patient had a temperature going from 103.6° to 104.8°; there had been epistaxis; the bowels were very loose. The next day one or two lenticular rose-spots were observed on the abdomen, but what particularly attracted attention was a strange general mottling of the skin, especially marked on the chest, abdomen, and thighs. By the 24th the mottling was nearly gone; a few new rose-spots were observed on the left side of the abdomen. The temperature, that had been ranging between 102.5° and 104.4°, was somewhat lower —between 102° and 103.6°. On the 27th, though the mottling could still be seen, it was very indistinct, but many rose-colored typhoid spots were perceptible. On the 28th, the fifteenth day of the disease, a curious coarse, granular eruption like measles, but not crescentically arranged, and affected by, but not disappearing on pressure, showed itself on the shoulders and upper part of the arms. It was not associated with any rise of temperature: on the contrary, before its appearance the morning temperature marked only 99°, the lowest it had attained at all, and during the evening it rose to 104°, about the same that it had been the two previous evenings. The tongue was dry and cracked; there were no bronchial symptoms. The next day the measly rash still persisted; it was evident on the shoulders and upper part of the arm, and there was in addition most marked redness of the neck and lower part of the arms, of the hands, and of the chest, closely resembling scarlet fever. Neither coryza nor sore-throat was present. The scarlet fever redness left white traces when the fingers were rapidly drawn across the skin, but the hyperæmia returned. There was no redness of the face. The urine was acid, and contained no sugar, no albumin, or casts. The Widal test gave a positive reaction. Four days after the appearance of the measly rash it had gone entirely, and the scarlet fever redness was only visible on the neck, and even there had faded. The general mottling of the whole body remained. On the afternoon of the same day the temperature, without any apparent cause, went up from 101° to 103°, and the erythematous, scarlatiniform rash at once returned on the neck, chest, and wrists. There was no recurrence of the measly rash; the flush of the skin vanished in forty-eight hours, and came back no more. Lenticular typhoid spots remained. The patient now entered upon convalescence.

The pathological condition is, I think, a hyperæmia of the skin, with here and there in the measly form an exudation in its layers, most likely a swelling and thickening of the corium and rete Malpighii, much as it exists in measles; but I can merely surmise this, as I have no anatomical observations to offer. It is not easy to determine how these eruptions are produced, and, while several views suggest themselves, no definite proof can be given of their absolute correctness. That the rashes are not caused by the administration of any remedy, which, like quinine or iodide of potassium, gives rise to cutaneous eruptions—a dermatitis medicamentosa—is certain, for they may be encountered, no matter what the treatment employed. The bath treatment is not responsible for them. It was not used systematically in any of the cases detailed in this paper, though in some with high temperature the bath was at times resorted to. The anomalous rashes may be the result of the irritation of the skin from the bacilli in the infected blood; but I believe rather that they are the expression of disorder of the cutaneous nerves, that they are due to the vasomotor disturbance; but how this is caused is very doubtful. It, too, may be from direct bacillar irritation, though rapid changes in the eruption, its appearance, often sudden, and disappearance, equally sudden, are against this view. More likely is it from the blood infection, but whether this be due to the toxins from the bacilli or the absorption of the broken-down material in the diseased intestine, must be a mere surmise. Yet we have a strong analogy in the production of ordinary urticaria, which we constantly see arising from the absorption of products of certain articles of food that are not readily digested, but which is also met with from purely nervous causes, as from mental excitement or sudden emotion; and it is a remarkable fact that urticaria, too, sometimes happens in typhoid fever. I have myself never seen any instances, but they have been described by Griesinger, and Dr. Woodbury has recently called my attention to a case that occurred in his practice.

The nervous element and the vasomotor disturbance are certainly very strong factors in the production of these typhoid fever rashes. Lemaigre,[1] who does not believe that they are always due to the same cause, cites a case of Siredey's, in which a man went on having scarlatiniform eruptions for years afterward. The first of these rashes happened in typhoid fever, and was even followed by desquamation. He recovered entirely, but had nine subsequent attacks in the succeeding years, each also followed by desquamation.

The nervous element showed very strongly in this case, which was under my care at the Pennsylvania Hospital:

CASE IX.—T. G., aged twenty-five years, a man of excellent physique and good habits, was in the Pennsylvania Hospital with typhoid fever in September, 1880. During its course marked flushing of the face was noticed, and he stated in explanation that he always flushed readily and from the slightest cause. There were successive crops of rose-spots, even on the arms. During convalescence he had an attack of general erythema, looking like a scarlet-fever eruption, but unconnected with sore-throat. He was discharged from the hospital November 22d, and returned in December with severe pain in the back and the sciatic nerve on the right side, said to have followed sleeping in a cold, damp place. It was attended with moderate fever, which lasted for nearly two weeks, and concerning which it was doubtful whether it was a typhoid fever relapse or not. It was not accompanied by rose-spots or enteric symptoms or albuminuria, but as it kept up without apparent cause it was looked upon as a typhoid-fever relapse. In its course it was observed that whenever he was spoken to in a decided manner there was flushing of the whole surface; indeed, the arms and face especially flushed under the least excitement. The flushing in the face was attended with a sense of heat, but this was not the case in the rest of the body. After keeping quiet for a few minutes the erythema always subsided, leaving a mottled appearance of the surface. There was no sore-throat, and no desquamation ever followed the erythematous flushings, but engorgement of the capillaries gave to his skin the appearance of scarlet fever. It was, however, only in parts uniform; in others in uneven patches, and it was not attended with any feeling of cold or with itching. There was never any evidence of rheumatic affection of the joints, muscles, or heart. The temperature, which ranged about 101°, did not become normal until eighteen days after his readmission into the hospital, and he was soon afterward discharged.

There is nothing in these rashes which seems to add gravity to the prognosis. It is true—though there are instances in this paper which show the contrary—that they mostly happen in severe cases of typhoid fever; especially does the morbilliform eruption, which is much more apt to occur later in the disease and to be associated with graver symptoms than the scarlatiniform rash. But the prognosis is to be determined by these symptoms rather than by the eruptions; and, as regards treatment, they call for no special line of therapeutics. As febrile albuminuria may coexist we must pay close attention to the renal secretions. It is from the point of view of diagnosis and pathology that these rashes merit attention and serious study.

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[1] Thèse de Paris, 1888, No. 209.

SOME REMARKS ON TYPHOID FEVER AMONG OUR SOLDIERS DURING THE LATE WAR WITH SPAIN.

By Victor C. Vaughan, M.D.,
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In August, 1898, Surgeon-General Sternberg appointed a board consisting of Major Walter Reed, U. S. A., Major E. O. Shakespeare, U. S. V., and the writer to study the causes and the spread of typhoid fever among the troops in the various camps within the United States. In accordance with this order the members of the board have been and are still engaged in this investigation. Although our work is as yet incomplete, and our conclusions may be somewhat modified after we have collected and compared more figures, we are apparently justified at present in formulating certain conclusions which may be of some interest to the profession. With the approval of the Surgeon-General and of my colleagues on the board I am permitted to present to you some of the facts that we have learned, with conclusions, which, in our opinion, are justified by these facts.

It may be well, in the first place, to say something concerning the methods which we have pursued in our investigation of this subject. In accordance with the instructions given us by the Surgeon-General we visited and carefully inspected all the larger encampments in the United States, including Camp Alger, the camps at or near Fernandina, Fla.; Jacksonville, Fla.; Huntsville, Ala.; Chickamauga Park, Ga.; Knoxville, Tenn.; Wycoff, N. Y., and Meade, Pa. In making this inspection, to which we gave about six weeks of time, we endeavored to ascertain by direct personal observation the conditions under which the soldiers lived. We visited nearly every regiment at each of these camps, made ourselves acquainted with the water-supply, the quality and quantity of the food, the preparation of the food, the nature of the soil of the camp, the space alloted to regiments, the arrangement and size of the tents and the number of men occupying each tent, the location of sinks with reference to the mess tents, the disposition of fecal matter and garbage, the thoroughness with which the camps were policed, etc. We visited regimental, division, and other hospitals, and ascertained the methods of disinfection practised in these hospitals. In short, we endeavored to see for ourselves everything that might have a bearing on the origin and spread of typhoid fever. While making this inspection we took the testimony of medical and other officers. We hoped to be able to interview at least one medical officer in each regiment, but this was not always possible. However, the information that we obtained in this tour of inspection was considerable and some of it of much value.

Since finishing the inspection we have been engaged in studying the records in the office of the Surgeon-General. In this study also we have regarded the regiment as the unit; following, however, the details of the course of the epidemic in each company constituting the command. We have endeavored to ascertain when typhoid fever first appeared in each regiment and how it afterward spread. How many cases there were in each company; if one or more companies furnished an unusually large number of cases; we have endeavored to ascertain whether or not the men in these companies have lived under unusual conditions. Thanks to the courtesy and intelligence of some of the regimental medical officers, we know how many men in each tent had typhoid fever and the initial date of each case. In our complete report we hope to give all these data, but in this paper I must content myself with general statements, substantiated by a few details.

We had not finished our first day's work at Camp Alger before we saw that one factor in the problem must be thoroughly dealt with before we could hope to reach a satisfactory solution. Fortunately we promptly took steps to acquaint ourselves with this factor. It cannot be denied that scientific medicine would have gained much had this factor been provided for at an earlier date. I refer to the question of the scientific diagnosis of typhoid fever. In the division hospital at Camp Alger we found most of the febrile cases diagnosed as malarial. We believed that they were typhoid fever, but the surgeons in charge had diagnosed them malaria. We requested that competent men, properly equipped for making blood examinations for the malarial plasmodium and the Widal test, should be sent to each of the larger camps. The Surgeon-General acted promptly on this suggestion. Drs. Gray and Carroll, of the Army Medical Museum, went to Camp Alger for this purpose. Subsequently Dr. Carroll continued this work at Jacksonville. Dr. Dock, of the University of Michigan, made investigations at Chickamauga, Knoxville, and Meade. Acting Assistant Surgeon Craig also spent several weeks in making blood examinations at Sternberg Hospital, Chickamauga Park. Dr. Curry, acting assistant surgeon at Fort Meyer, has made many hundreds of blood examinations upon sick soldiers sent from Camp Alger, Jacksonville, and other camps. As a result of the work done by these men we are able to state that malaria was a very rare disease among those troops who remained in the United States. Among the hundreds of blood examinations made on soldiers from Camp Alger the plasmodium was not found among the troops at this place. Dr. Dock found one case at Chickamauga and one at Meade. The one at Chickamauga was a private of the Second Arkansas Volunteer Infantry, who stated that he had had chills and fever at home in the spring of 1898 before he enlisted. The malarial case at Camp Meade belonged to one of the Pennsylvania regiments. Two weeks before the examination of the blood this man came, so he stated, from a camp on the banks of the Potomac. It will be seen, therefore, that in each of these cases the plasmodium was probably introduced into the system elsewhere than at one of the large camps.

Malaria was probably more frequent than these figures indicate, but that the long continued fevers diagnosed as malaria in nearly all the field hospitals were typhoid fever, there can be no doubt. The sick reports contain evidence in themselves that malaria was not a prevalent disease among the troops. The 158th Indiana, Sixth Ohio, and First West Virginia constituted at Chickamauga Park one brigade, and were encamped side by side. From the sick reports it appears that malaria prevailed in the Indiana regiment from May throughout the summer. There were no cases in the Ohio regiment in May, three in June, eleven in July, 103 in August, and 203 in September. In the West Virginia regiment malaria does not appear on the records until August, when 108 cases are reported. That there should have been malaria in the Indiana regiment in May and not a case in either of the other regiments in the same brigade, is not probable; and that it would have taken this disease two months, had Chickamauga been the fearfully malarious place it is said by some to be, progressing slowly through the Ohio regiment to reach the West Virginia regiment, is not in accord with any known epidemiological facts concerning this disease. Pushing our inquiry further, we find that in the Ohio regiment 273 individuals are recorded as having had malaria. Sixty-six of these were sick only a few days. Among those there may have been a few cases of malaria, but the probabilities are that even for these a diagnosis of febricula would have been quite as scientific. Of the 207 cases of protracted malaria, 148 were still sick when the last report consulted by us was made (October 31, 1898). This leaves fifty-nine cases of completed malaria, among which there are quoted twelve deaths. A death-rate of more than 20 per cent. in "mild, remittent malaria," as the disease is designated by one of the surgeons, is, to say the least, unexpectedly high.

To summarize concerning the so-called protracted malarias reported by the regimental surgeons, we will say that, in our opinion, practically all of these were typhoid fever, and the following are our reasons for this opinion:

1. The uneven distribution of the so-called malaria among regiments encamped side by side gives us cause to suspect that these were not malaria.

2. Some of the surgeons who failed to record their cases as typhoid state in their comments that typhoid fever prevailed in the regiment. One illustration of this may be of interest. From April to November there were in the Sixth Ohio, according to the recorded diagnoses in the monthly reports, only two cases of typhoid fever. Notwithstanding this fact, the acting assistant surgeon in charge at that time writes in the October report the following statement: "The health of the command is improving. The prevailing disease that has caused the sickness we have had is typhoid fever." And yet the September report showed only one cases of typhoid fever, and the October report showed only one case, and this one case was one and the same patient carried from the August report on to the reports for September and October.

3. The results of several hundred blood examinations show that malaria was a very rare disease among the troops that remained in the United States.

4. Malaria as it exists in this country is easily controlled by moderate doses of quinine. All the so-called protracted malarias in our camps were treated with large doses of quinine and were not improved thereby. Consequently, we must conclude that the diagnosis given these cases was erroneous.

5. The mortality of the so-called protracted malarias corresponds with the mortality of typhoid fever, and furnishes most positive proof that these cases were not malarial.

When we began to study the regimental sick reports we found that, in order to obtain satisfactory information, we must endeavor to ascertain how many cases of typhoid fever there were in each regiment, and it soon became evident that the regimental sick reports did not give this information. Of two regiments in the same brigade, one had more than 200 cases of recognized typhoid fever, as shown by the regimental reports, while the other regiment on like evidence had only two cases, but the records of the second regiment show more than 200 cases of protracted malaria, and these furnished a mortality as high as that of the typhoid fever in the first regiment. For the reasons already given, we have included all the protracted malarias among our list of the typhoids. It may be asked how long we have considered it necessary for a so-called malaria to run in order to make it a probable typhoid. In answer to this I will state that we have regarded all so-called malarias of ten days or more in duration as possible cases of typhoid fever. We think that the great rarity of true malaria and the readiness with which these rare cases have yielded to quinine, and the fact that quinine was so generally administered, justify us in this conclusion. Practically, however, the number of doubtful cases is exceedingly small.

Typhoid fever was not only diagnosed malaria, but it was covered up by many other names. In one regiment the death-rate from prolonged indigestion amounted to 15 per cent. of the completed cases. In another regiment at Chickamauga dengue is a frequent diagnosis of many cases which undoubtedly were typhoid fever. That dengue should have prevailed in one regiment only among the 60,000 troops at Chickamauga is too absurd to receive serious attention. By tracing all doubtful cases to the hospitals we have been able to reach a positive opinion concerning the nature of most of them. In some regiments we have made an alphabetical list of all the sick. In others we have taken only those who are recorded as having had some intestinal disorder, malaria, or some form of continued fever. In some regiments many cases were diagnosticated simply continued fever. In others the surgeons seemed to regard enteric fever as distinct from typhoid fever. The belief of some of the medical men in " typho-malaria " is evident by their reports.

The origin of typhoid fever in all the larger encampments is easily determined. Many of the volunteer regiments and some of the regular regiments were infected with typhoid fever before they reached the national camps. A few illustrations may be interesting. The Sixth Ohio reached Chickamauga Park on May 18th with a case of recognized typhoid fever. This patient was kept in the regimental hospital until he died, May 24th. The Ninth New York arrived at Chickamauga May 25th. There was a suspiciously prolonged case of diarrhœa on June 10th, and one of enteric fever three days later. The Thirty-first Michigan arrived May 17th, and furnished a recognized case of typhoid fever June 1st. The First Arkansas reached Chickamauga May 27th, and sent a probable typhoid case to the division hospital June 2d, and a recognized case of typhoid fever June 3d. The Fifty-second Iowa came May 31st, and the surgeon recognized a case of typhoid fever June 8th. The First Missouri went into camp at Chickamauga May 21st, and had a suspicious case May 31st. The Fifth Missouri came May 27th, and furnished a suspected case June 6th. The Second Kentucky arrived May 26th, and, so far as the records show, had no typhoid fever until June 26. The Second Missouri arrived May 20th, and furnished a probable case May 26th. The Twelfth New York came May 20th, and the first suspected case had its initial date ten days later. The First New Hampshire arrived May 22d, and two days later entered on its sick report a case that was most probably typhoid fever. The Eighth New York arrived May 25th, and did not show any evidence of the existence of typhoid fever until June 24th. However, as this patient died July 1st, it is probable that the true initial date was earlier than is indicated. The Second Ohio arrived May 18th, and two days later a case diagnosed as "gastro-enteritis," and which may have been typhoid fever, was treated in the regimental hospital. These are not selected regiments, but these data were taken from a bundle of records at hand at the time of this writing, and each record in the bundle was examined. It is safe to say that more than 90 per cent. of the volunteer regiments that went to Chickamauga Park reached that place infected with typhoid fever. So wide-spread is typhoid fever in this country that in assembling a regiment of volunteers the probabilities are that one or more men in the regiment will be found to be infected with this disease at the time of enlistment. Medical officers might do well to bear this in mind and be on their guard for the detection of the first case of typhoid fever. Instead of doing this, many medical officers will refuse to recognize typhoid fever until it assumes epidemic proportions, and the records that we have studied show us that often when typhoid fever has become an epidemic some medical officers still refuse to give the disease its right name and prefer to call it something else. This aversion to calling typhoid fever by its right name seems to exist among medical officers in all armies. The German medical officer often calls the disease "gastric fever," and this term appears now and then in our records when the surgeon happens to be a German. The French call it "manœuvre fever." I am inclined to the opinion that medical officers often are led to suppress the diagnosis of typhoid fever for fear of the alarm that it will give the patient and others. This, however, is a mistake. We will not eradicate this disease from our camps unless we early recognize its presence and take proper steps to prevent its spread. Typhoid fever in a camp should be reported to medical headquarters and to the medical officers of other regiments as diphtheria in a school should be reported.

It may be well to emphasize the fact that our troops frequently carried in their own persons the typhoid infection to the national encampment. Some acquired the disease at the State encampments and others brought it directly from their homes. In one of the Alabama regiments typhoid fever was at first confined to one company, and this company came from a town where there was an epidemic of the disease at the time when the men enlisted. From this company the disease spread through the regiment.

The next question, How did typhoid fever spread among the troops? In answering this inquiry we quite naturally first direct our attention to the drinking water. So far as our studies have been carried up to the present time, the evidence concerning water infection in the camps visited is, for the most part, negative. There is no evidence that the general water supply at the larger encampments was infected with typhoid fever. At Jacksonville the general water supply to all the regiments was from artesian wells a thousand feet deep, and infection of this water seems well-nigh impossible. Moreover, in round numbers there were at Jacksonville last August and September 30,000 soldiers and about the same number of residents. Both soldiers and citizens used the same drinking water, and yet there was a widespread epidemic of typhoid fever among the soldiers and only a few sporadic cases among the citizens. At Knoxville the soldiers and citizens used drinking water from the same source, and at the time of our inspection, September, 1898, there were hundreds of cases of typhoid fever among the soldiers, and the records of the health officer of the city showed no evidence of the existence of the disease among the citizens. Some of the regiments at Chickamauga drank water from the creek, which might have been contaminated. These regiments suffered from typhoid fever, but other regiments which had no water from Chickamauga Creek and which brought their supply a long distance from mountain springs, the contamination of which is highly improbable, had typhoid fever just as badly as did those who drank water from Chickamauga Creek. There is another very interesting point in this connection. The three regiments of a brigade are encamped side by side; water from the same pipes is distributed alike to all these regiments; and yet typhoid fever has prevailed for twenty days and has become an epidemic in one of these regiments, while one of the others remains wholly free from the disease. A similar condition is observed when we study the distribution of the disease among the companies in a regiment. I think that we have found evidence of water infection at some of the minor camps, and it is probable that soldiers while off duty and out of camp drank from infected wells, but we are quite confident that the general water supply of the larger camps was not infected, and that water infection played a very subordinate rôle in the spread of typhoid fever among the soldiers in the camps in this country.

All know that the specific bacterium of typhoid fever is eliminated from the bodies of those sick with this disease in the urine and feces, especially in the latter, and that the disease is transmitted from one person to another by the transference of some part of the feces from the sick to the alimentary canal of the well. It follows that the spread of typhoid fever will depend upon the disposition of the excretions of those infected. On this point we have some interesting information. The first division of the Seventh Army Corps had during its stay at Jacksonville water carriage for its fecal matter. Each company was supplied with a galvanized iron trough, the lower end of which was connected with the sewer. The connection between the trough and sewer was closed by a cylindrical plug, which could be raised whenever it was desired to discharge the contents of the trough. The other end of the trough was connected with the water hydrant. The trough was partially filled with water, and in this condition received the excrement. The contents of the trough were discharged at will.

The second division of the same army corps was furnished with tubs or half-barrels. The fecal matter and urine were received in this without the addition of lime, dirt, or anything else. When these tubs were filled they were carted away by scavengers, emptied, cleaned, and returned. The fecal matter in the tubs was always exposed to flies, the contents were often spilled about the camp and slopped out along the road.

The third division disposed of its fecal matter in pits, as is ordinarly done in camps. Orders were issued that the contents of the pits should be covered once, twice, or three times a day, differing in the different regiments. In some regiments attempts were made to compel each individual to cover his stool as soon as deposited.

It will thus be seen that in the three divisions there were three distinct methods of disposing of fecal matter. The men in these divisions were supplied with the same water, the same rations, lived in the same kind of tents, in the same climate, and, in fact, the only difference was in the method of disposing of the fecal matter. In August and September there were more cases of typhoid fever in one regiment of the second division than in all the six regiments then constituting the first division, while the third division furnished an intermediate number. It will thus be seen that when the feces were swept out of camp with a minimum possibility of camp contamination, typhoid fever was less prevalent.

The most potent factor in the spread of typhoid fever at most of the camps was camp pollution with infected fecal matter. This was true at both the large and small encampments. It was equally true of the smaller State camps, usually of one regiment, in the Northern States, and the large national encampments of one or more corps in the South. The Fifteenth Minnesota at St. Paul and Fort Snelling, the Thirty-fifth Michigan at Island Lake, and the 203d New York at Camp Black became quite as badly infected as did any of the regiments at Chickamauga, Jacksonville, or Camp Alger. The epidemic of typhoid fever was not due to sending Northern men to Southern camps; nor was it due to the massing of many regiments together, but it was due to camp pollution. In most of the camps fecal matter was deposited in pits. Flies swarmed over the infected fecal matter and then walked over the food at the mess-tents. In many of the regimental camps fecal matter was deposited about the camp on the ground. There were pieces of woodland at Chickamauga Park through which one could not walk without soiling his shoes with fecal matter. In some of the regimental camps at Tampa the sinks were overflowed by the rains, and fecal matter floated through the companies' streets. In many regiments paper soiled with fecal matter was blown about the camp. In a few instances it happened that, when a regiment was compelled to occupy a site vacated by another regiment, in digging the sinks for the newly arrived command the men found themselves in the filled sinks of the regiment that first occupied the ground. In at least one company, a New York regiment, a small cesspool was dug in front of each tent, and this received the wash-water and probably at night the urine. In one of the Pennsylvania regiments the men of one company dug a shallow well for drinking water in a location where the water was in all probability contaminated, and this company had an unusually large number of cases of typhoid fever. At Chickamauga a soldier was found attempting to run the guard by getting into one of the barrels on the wagon on its way to the spring to bring drinking water for the regiment. We walked through the regimental camp to which this soldier belonged, and we can testify to the fact that, although we picked our way, the soles of our shoes were soiled with fecal matter before we finished the round of inspection. In this way men carried fecal matter into their tents; and clothing, blankets, and tentage undoubtedly became infected in many instances. These are some of the ways in which the infection of typhoid fever was spread.

We have considered the question of milk-supply in all the camps visited, and can state that there is no evidence that milk was a general or frequent vehicle for the distribution of typhoid fever.

We are convinced from our observations that, when water carriage for the disposition of fecal matter cannot be secured, the complete sterilization of all fecal matter is necessary to prevent the spread of typhoid fever in camps occupied for three weeks or longer. For this purpose we have recommended that each company be furnished with a specially constructed galvanized iron trough. This trough is to be partially filled with a saturated solution of milk of lime, and is to be emptied daily by means of an odorless excavator. In large camps one odorless excavator will serve a brigade, and the cost of each trough will not be more than $15.

It must be evident to all by this time that the prevention of disease is the most important duty of army medical officers. We think that it is cheaper and no less humane to prevent sickness than it is to care for the sick. Moreover, prevention of sickness conserves the fighting force, keeps the men in good spirits, renders good discipline more easy, prevents that demoralization that comes with every epidemic, and in every way renders an army more efficient. The success of many a campaign depends as much upon the hygienic measures enforced as it does upon the military skill of the line officers. The medical officer needs special training in military hygiene, and should be selected with more care than has been exercised in the past. He should be given more authority, and then more should be expected of him.

To what extent did typhoid fever prevail among the troops encamped in this country during the summer of 1898? Owing to the aversion shown by medical officers to diagnosing this disease correctly, as has already been mentioned, it is difficult to answer this question exactly.

The following figures show the extent to which typhoid fever prevailed among twelve regiments belonging to the First and Third Army Corps:

Name.	Time.	No. of recognized cases.	No. of probable cases.	No. of deaths among completed cases.	Total deaths.
12th New York	May to November	157	490	10	17
1st Arkansas	May to September 15	81	228	13	22
8th New York	May to September 9	190	425	16	21
2d Missouri	May to November	180	268	17	13
2d Ohio	May to October	184	403	14	14
1st New Hampshire	May to September 12	211	297	7	29
52d Iowa	May to September	175	345	20	35
1st Missouri	May to September 8	45	216	5	17
5th Missouri	May to October	47	212	8	16
31st Michigan	May to October	84	239	7	9
2d Kentucky	May to September 15	89	286	14	27
9th New York	May to September 12	141	323	21	41
Total		1584	3732	152	261

Some explanation of this table may be desirable. The first column gives the name of the regiment; the second column indicates the period of time covered by the reports from which the data are taken. Some of the regiments were mustered out early in September, while others continued in service throughout November and even later. The third column gives the number of recorded typhoid cases in each regiment; the fourth column gives the number of cases of typhoid fever in each regiment, according to our estimate, after going over the regimental and hospital reports; the fifth column gives the number of deaths among the completed cases of probable typhoid fever; the sixth column gives the total number of deaths from disease in the regiment as reported to the War Department up to December 2, 1898. It will be seen from this table that twelve regiments furnished 3732 probable cases of typhoid fever, and we are quite thoroughly convinced that in this list of probable cases there are very few if any doubtful ones. This gives an average of a little more than 300 cases per regiment. In this list the smallest number of cases is furnished by the Fifth Missouri, which had 212, and the largest number by the Twelfth New York, which had 490.

We have tried to ascertain the mortality among the typhoid fever cases, but at present we are not able to give any exact figures. The fifth column in the above table shows the number of deaths among the completed cases of typhoid fever. It must be understood that many of these deaths occurred among so-called malarial cases. This column foots up 152 deaths among the completed cases in the twelve regiments; there were 3732 probable cases in these regiments. This gives a mortality of a little more than 4 per cent. It must be understood, however, that this is altogether too low, because there is in this computation no data concerning the deaths among the incomplete cases. We have attempted to get the total number of deaths from the records in the War Department, and the sixth column gives us figures for the total number of deaths up to December 2, 1898. These figures indicate the total number of deaths from all diseases. That these figures are too low is shown by referring to the record for the Second Missouri in the above table. According to the figures furnished us by the War Department, there was, up to December 2, 1898, a total of thirteen deaths in this regiment, but the regimental and hospital records show us that up to November, 1898, there were seventeen deaths among the probable typhoid fevers only. Supposing that the deaths reported to us from the War Department were all due to typhoid fever, we would then have among the probable cases of typhoid fever a death-rate of a little less than 7 per cent. All that we can say, then, at present is that the death-rate among the probable typhoid cases at Chickamauga, as shown by these twelve regiments, was somewhere between 4 and 7 per cent., with the probabilities very much in favor of it being much nearer 7 than 4 per cent. Our general impression during our inspection of the regiments and hospitals was that the death-rate among the typhoid fevers was very low; but 7 per cent. or 6 per cent., or even 5 per cent., is not a low mortality for typhoid fever among soldiers. In civil practice we have a right now to expect a death-rate of not more than 7 per cent. This death-rate should be much less among men who are picked on account of their physical perfection. We will endeavor to get more exact data concerning the mortality.

It is a striking fact that the majority of the men who had typhoid fever had no preceding disease. We went into this work with the preconceived idea that diarrhœa and other intestinal disorders rendered men more susceptible to typhoid fever, and therefore we fully expected to find that typhoid fever prevailed more largely among those who had some form of intestinal trouble. Our studies thus far have shown us that this is not true, and that more than 80 per cent. of the typhoid fever cases do not appear upon the sick reports until they are taken with typhoid fever. As illustrating the relation between preceding intestinal disorders and typhoid fever, we will take the following from our history of typhoid fever in the First West Virginia. There were

260 cases of probable typhoid fever in this regiment. Five of these had the date of their illness in November, and four others did not belong to any company. Deducting these, the twelve companies furnished 251 cases of typhoid fever. Supposing that each company had its full quota of 106 enlisted men and three commissioned officers, then 1308 men furnished 251 cases of typhoid fever. There are 585 individuals in this regiment who are reported as having had some intestinal disorder, and apparently 723 escaped disease of this kind. The 585 persons furnished 82 cases of typhoid fever—1 to 7.13; the 723 individuals furnished 169 cases of typhoid fever—1 to 4.6. However, these figures do not represent the facts. Of the eighty-two cases of typhoid fever, forty-two were not preceded by any intestinal disorder. Therefore, 543 persons who had intestinal disorders of some kind furnished forty cases of typhoid fever—1 to 13.7; and 765 persons who had no intestinal disorder furnished 211 cases of typhoid fever—1 to 3.64. A little more than 84 per cent. of the typhoid fevers in this regiment were not preceded by any recorded intestinal disorder. It seems to us that only one conclusion can be drawn from these facts. Many of the diarrhœas must have been due to or at least accompanied by a typhoidal infection.

Another interesting thing about the typhoid fever cases is that in a considerable number of those preceded by some disorder, whether malaria, diarrhœa, or indigestion, the disorder occurred in such close connection with the typhoid fever as to cause us to believe that it was due to or accompanied by typhoid infection. The following cases, taken from the records of the Sixth Ohio, illustrate this point. It should be stated that in this regiment all the cases of typhoid fever, with two exceptions, were diagnosed as malaria or indigestion.

No. 1.—Indigestion, August 24th to 25th; malaria, August 31st to October 8th.

No. 2.—Diarrhœa, August 16th to 17th; malaria, September 20th to October 8th.

No. 3.—Indigestion, September 11th to 13th; malaria, September 24th; died October 8th.

No. 4.—Diarrhœa, September 5th to 6th; malaria, September 10th; still sick, October 31st.

No. 5.—Indigestion, September 4th to 8th; indigestion, September 15 to 16th; malaria, September 20th; still sick, October 31st.

No. 6.—Diarrhœa, August 14th and 15th; malaria, August 18th to October 19th.

No. 7.—Continued fever, September 7th to 9th; malaria, September 10th and 11th; continued fever, September 26th; still sick, October 31st.

No. 8.—Continued fever, August 12th to 16th; malaria, August 19th to September 21st.

No. 9.—Diarrhœa, August 22d and 23d; malaria, August 25th to October 25th.

No. 10.—Diarrhœa, August 13th to 16th; malaria, August 18th; still sick, October 31st.

No. 11.—Indigestion, September 15th and 16th; continued fever, September 24th; still sick, October 31st.

No. 12.—Diarrhœa, August 12th and 13th; malaria, August 19th to September 21st.

No. 13.—Indigestion, August 5th and 6th; malaria, August 18th to October 28th.

No. 14.—Diarrhœa, September 12th to 14th; indigestion, October 14th to 16th; continued fever, October 18th; still sick, October 31st.

No. 15.—Indigestion, August 16th and 17th; malaria, August 17th to September 23d.

No. 16.—Diarrhœa, August 14th to 16th; malaria, August 18th to September 21st.

No. 17.—Diarrhœa, September 6th and 7th; malaria, September 12th; died September 22d.

No. 18.—Indigestion, August 22d to 27th; malaria, August 29th; still sick, October 31st.

No. 19.—Diarrhœa, September 2d and 3d; malaria, September 5th; still sick, October 31st.

No. 20.—Remittent malaria, Sepember 6th to 8th; continued fever, September 10th; still sick, October 31st.

No. 21.—Indigesion, September 9th to 11th; malaria, September 14th; still sick, October 31st.

No. 22.—Diarrhœa, September 14th to 16th; continued fever, September 19th; still sick, October 31st.

No. 23.—Diarrhœa, August 20th and 21st; malaria, August 29th to September 1st; malaria, September 2d and 3d; malaria, September 5th and 6th; continued fever, September 29th; still sick, October 31st.

No. 24.—Diarrhœa, September 21st and 22d; indigestion, September 30th to October 3d; continued fever, October 6th; still sick, October 31st.

No. 25.—Diarrhœa, August 8th and 9th; diarrhœa, August 13th and 14th; malaria, August 20th to October 31st.

No. 26.—Indigestion, August 19th to 21st; continued fever, August 29th to October 24th.

No. 27.—Diarrhœa, August 4th and 5th; diarrhœa, August 7th and 8th; malaria, August 19th; still sick, October 31st.

No. 28.—Diarrhœa, September 12th to 14th; malaria, September 15th to 17th; continued fever, September 19th; still sick, October 31st.

No. 29.—Indigestion, September 15th and 16th; continued fever, September 25th; still sick, October 31st.

No. 30.—Simple fever, July 14th to 22d; diarrhœa, August 2d and 3d; continued fever, August 21st; still sick, October 31st.

No. 31.—Malaria, August 13th and 14th; malaria, August 19th to September 21st.

No. 32.—Indigestion, August 21st and 22d; malaria, August 29th; still sick, October 31st.

No. 33.—Simple fever, August 9th to 21st; malaria, August 26th to September 30th.

No. 34.—Diarrhœa, August 21st and 22d; continued fever, August to September 24th.

No. 35.—Diarrhœa, August 13th and 14th; malaria, August 29th to September 25th.

No. 36.—Diarrhœa, August 14th and 15th; diarrhœa, August 17th and 18th; malaria, August 29th; still sick, October 31st.

No. 37.—Simple fever, August 12th to 15th; diarrhœa, August 20th to 24th; malaria, August 29th; still sick, October 31st.

No. 38.—Malaria, September 10th and 11th; indigestion, September 14th to 16th; malaria, September 16th; still sick, October 31st.

Hundreds of cases of this kind are recorded on the sick reports. In our opinion, the preceding illnesses in many of these cases were connected with the typhoid fever infection. The most rational explanation, so far as we can see, is that in the majority of these cases the infection was a mixed one, in which saprophytic germs greatly predominated in numbers. The preceding illnesses are believed to have been due to the action of the saprophytic micro-organisms.

In our studies we have had frequent occasion to observe that among the soldiers typhoid fever was often far advanced before it was recognized. That this was a potent factor in the spread of the disease in camps must be evident. With many unrecognized cases of typhoid fever defecating in the pits and on the ground over which men walked, drinking from the same water receptacle, eating from the same mess, and occupying tents in common with others, the chances of the transmission of the specific infection was great. This is illustrated in the Eighth New York. Many cases sent from this regiment to the New York hospitals were found to be convalescing from typhoid fever when they reached the hospital, and the disease had been diagnosed malaria prior to this time.

In military experience typhoid fever is often apparently an intermittent disease. The following cases illustrate this:

No. 1.—Intermittent malaria, August 10th to 15th; diarrhœa, August 19th to 21st; remittent malaria, August 21st to 25th; advanced typhoid fever recognized in hospital, September 9th.

No. 2.—Diarrhœa, July 30th to August 5th; intermittent malaria, August 17th to 22d; remittent malaria, August 22d; granted sick leave, August 27th; sent to Presbyterian Hospital, in New York City, September 9th, with advanced typhoid fever.

No. 3.—Intermittent malaria, August 13th to 18th; remittent malaria, August 18th; granted sick leave, August 31st; sent to St. Luke's Hospital, in New York City, September 9th, with advanced typhoid fever.

No. 4.—Intermittent malaria, August 13th to 18th; remittent malaria, August 18th to 23d; granted sick leave, August 29th; sent to St. Luke's Hospital with advanced typhoid fever, September 9th.

No. 5.—Diarrhœa, July 10th and 11th; diarrhœa, July 22d to 25th; diarrhœa, July 30th to August 4th; intermittent malaria, July 6th to 20th; remittent malaria, August 23d to 24th; granted sick leave, August 27th; sent to Mt. Sinai Hospital, New York, September 9th, convalescing from typhoid fever.

Hundreds of other cases might be given to illustrate the apparently intermittent character of many cases of typhoid fever. We have stated that these are "apparently" intermittent. We do not intend to state that these apparent intermissions were afebrile. It is probable that a temperature-record would show that this was not the case. We mean that there were periods when the patient felt better, and for this reason was returned to duty.

The influence of change in location of camps upon the continuance of typhoid fever is exceedingly interesting. We have not investigated this subject as thoroughly as we hope to do. At present, however, I think that we can give the following conclusions:

(*a*) A regiment thoroughly infected with typhoid fever does not lose the disease when it changes its locality, even when it goes to a perfectly unobjectionable site and leaves all its sick behind. Evidence of this is shown in the history of the whole of the Second Division of the First Army Corps when it moved from Chickamauga to Knoxville. At Chickamauga Park this division became thoroughly saturated with typhoid fever. After reaching Knoxville, and notwithstanding the fact that the camp site was probably as fine as any in the world, the water-supply unobjectionable, the nature of the soil suitable for the digging of sinks, surface drainage good; notwithstanding all of these advantages, typhoid fever prevailed more largely than it did at Chickamauga. It is altogether probable that the clothing, blankets, and tentage of the men became thoroughly infected with the typhoid bacillus. When a regiment becomes saturated with typhoid fever, change in location alone is not sufficient to get rid promptly of the disease. We believe that it will be necessary in such a case thoroughly to disinfect clothing, blankets, tentage, etc.

(*b*) If a regiment be moved before the infection has become marked, typhoid fever may disappear or at least decrease.

(*c*) Apparently a sea voyage of some days or weeks might rid a command, not widely infected with typhoid fever, of the disease. We have some illustrations of this in the troops that went to Cuba. For intance, about half of the First Volunteer Cavalry went to Cuba, while the other half remained at Tampa. Before the departure for Cuba, and while the regiment was all together, typhoid fever appeared, and its prevalence was confined to those companies that went to Cuba. Apparently this part of the regiment lost its typhoid fever on its way to Cuba, while the part that remained behind became badly infected.

(*d*) A regiment thoroughly infected with typhoid fever does not lose the disease or lessen the number of cases after a short voyage at sea. This was illustrated by the Nineteenth Infantry, which, after becoming thoroughly infected with typhoid fever, was transported to Porto Rico. The progress of the disease apparently was not in the least retarded by this voyage.

THE COEXISTENCE OF CARCINOMA AND TUBERCULOSIS OF THE MAMMARY GLAND.

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THE number of cases that have been reported of primary tuberculosis of the mammary gland is not large. Scudder (THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, July, 1898) gives an exhaustive review of this condition, with a list of eighty cases recorded as tuberculosis of the breast. Of these he rejects twenty-three as lacking in positive anatomical and bacteriological evidence; four he considers from the history to be distinctly secondary, and the remaining fifty-three cases he concludes to be the only instances of primary tuberculosis of the breast recorded in the literature. Even in a number of these accepted cases the diagnosis rests on insufficient grounds, the bacillary evidence being entirely lacking and the histological features not conclusive, so that the actual number of carefully studied cases becomes very much smaller. It is, however, probable that the disease occurs with relative frequency, but the possibilities of its escaping observation are very great. I am supported in this view by the fact that in four years' service as examining pathologist to the University Hospital I have met with five cases, three of primary and two of secondary tuberculosis of the breast. These cases are as yet unrecorded, and should be added to Scudder's list. Two of the primary cases I shall report in this article; the third one was sent to me for diagnosis by Dr. Smith, of Grand Rapids; the two cases of secondary infection were autopsy cases of chronic pulmonary tuberculosis with universal metastasis.

In spite of the probable relative frequency of this condition and the fact that carcinoma of the breast is one of our most common clinical conditions, the coexistence of the two processes in the same gland is apparently very rare. I have been unable to find in the literature a single undoubted instance of such a combination, so that the two cases to be reported here must be looked upon as being unique pathological conditions.

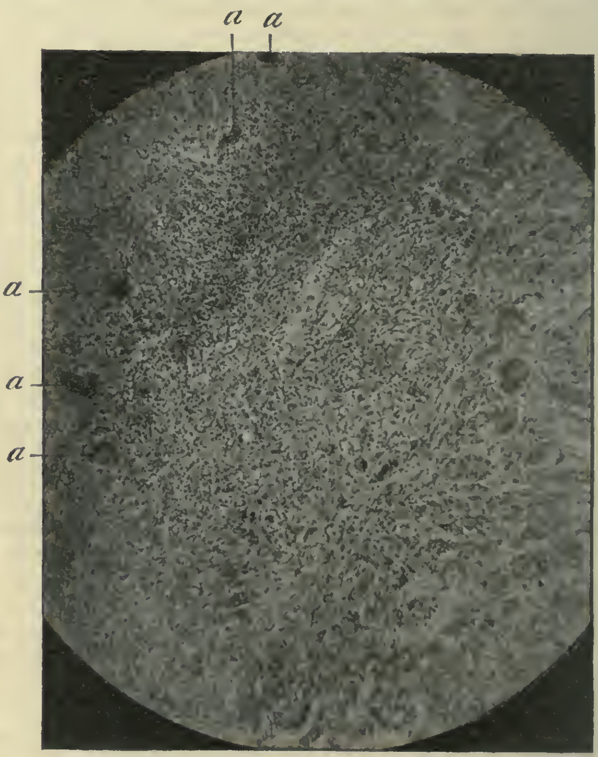
CASE I.—Portions of a breast tumor were sent to me for examination by Dr. Carl Warden, of Ishpeming, Mich. After returning a diagnosis of tuberculosis of the breast, the following history of the case was sent to me by Dr. Warden.

Mrs. F., aged forty years, a Scandinavian, of good family history, gave birth to her last child at the age of thirty-nine. For several months previous to this conception she had had irregularity of menstruation. Delivery was normal, and the child was nursed for eleven months, having been weaned about six months before the removal of the breast-tumor. During lactation and subsequently the patient has not menstruated. She has three other children, all four being alive and well. Up to the nursing of the third child both breasts were used, but at the time of the birth of this child she noticed a scarcity of milk and a general tenderness in the right gland. The nipple was "sore" and gradually became retracted. The use of this breast was finally abandoned altogether. The nipple remained permanently retracted. Two years after this the last child was born, and was nursed from the left breast alone. There were no signs of activity in the other gland. At the time of weaning this last child, eleven months after its birth, her attention was again called to the right breast by a feeling of soreness, and she discovered a lump about the size of a hazel-nut in the upper and outer portion of the breast. This was hard and tender on pressure. It grew slowly, and in three months reached the size of a hickory-nut. A month later the breast was examined by Dr. Warden, who found in the inner portion of the gland a hard, irregular mass. This was movable and not attached to the overlying skin. In a week it had increased very rapidly, involving the lower segment of the breast. Enlarged glands were found in the axilla. The patient suffered from a feeling of weight and uneasiness in the breast, and from sharp, stabbing pains radiating to the shoulder and right side. A week later the entire organ showed involvement, and the overlying skin had a reddish, mottled appearance, and in places was adherent to the growth below. A diagnosis of malignancy was made, and operation was advised. This was performed two days later. The growth in the meantime had softened, and fluctuation was evident. An exploratory incision was made below the nipple, and about an ounce of creamy pus was evacuated. The gland had a dense, stony character. A portion of its substance was taken for examination. A diagnosis of tuberculosis was returned. The diseased portions of the gland were removed. After the operation there was marked improvement, the pain almost entirely disappeared, and there was but slight tenderness on pressure. For a time there was moderate purulent discharge, but this was not offensive. The remaining portion of the gland was dense and brawny throughout, and the nipple was entirely obliterated. The patient was somewhat anæmic, but had lost no weight and showed no indications of any pulmonary complication. A letter recently received from Dr. Warden, now of Nashville, Tenn., states that the patient recovered entirely, and is now in good health.

Microscopical Examination. The sections of the portions of the gland sent for examination showed numerous tuberculous nodules, varying in size from small miliary tubercles to large confluent nodules showing caseation. The tuberculous infiltration is in all cases periacinous, surrounding the acini very regularly and uniformly. This periacinous growth shows very different stages of development. In the smallest nodules the acinus or group of acini is surrounded by a mass of epithelioid tissue, containing many giant-cells and lymphocytes. The basement membrane is intact, and in some cases it has undergone a proliferation, so that the epithelium of the acinus is separated from the epithelioid tissue by a thick, concentrically arranged capsule of connective tissue. In other cases the basement membrane has entirely disappeared, and the epithelial layer lies surrounded on all sides by epithelioid cells. The epithelium in many places preserves its continuity, but the lumen of the acinus is collapsed and the two layers of cells are crowded closely together. Around these collapsed rings of acinous epithelium are numerous large giant-cells, many having branched processes, the largest ones showing caseating protoplasm and peripherally arranged nuclei. The relations of these large giant-cells to the epithelium are very striking. In several instances the detached ring of epithelial cells is bent into a horseshoe shape by the pushing-in from one side of one of these giant-cells. In some cases the epithelium lies between three or four large giant-cells, whose protoplasm does not show caseation. These giant-cells show distinct evidences of phagocytic action, as they contain portions of epithelial cells and occasional leucocytes. Usually the nuclei and protoplasm of the epithelium are well preserved; in a few places they contain fat droplets, but where completely surrounded by the giant-cells their nuclei are lighter and less definite in outline, and the cell protoplasm is irregular and hazy. The study of the sections tends to give a distinct impression of the destruction of the epithelium by the giant-cells. Around the larger canaliculi and ducts the same tuberculous infiltration is found. Into one duct there is an ingrowth of epithelioid cells containing many giant-cells. The basement membrane and epithelial layer are intact, except at one side, through which these cells have burst and grown out into the lumen. In a few instances large branched giant-cells could be seen pushing through the basement membrane, and between the epithelial cells out into the duct. There is throughout the appearance of an invasion of the glandular structures by an epithelioid tissue arising in the connective tissue. In several places the gland tissue has entirely disappeared, and a large, caseating area of epithelioid tissue, abundantly infiltrated with lymphocytes, is found. This tissue is very poorly supplied with bloodvessels, but contains large lymph-spaces. In one portion of the material examined there was found a large abscess cavity, its walls consisting of necrosing leucocytes and epithelioid cells.

In many of the larger epithelioid nodules which have completely surrounded and obliterated the gland-structures the epithelial cells of the gland remain living and well preserved, surrounded by and in intimate contact with the new tissue. In some cases they are separated from each other, in other instances they are still united. In these loosened epithelial cells of the gland, lying free from their basement membrane in the lymph-spaces formed by the new cells of the tuberculous growth, there is in many instances a marked tendency to proliferation. Cell-division forms are abundant, both mitotic and amitotic, chiefly pathological forms of the latter type, forming cells with large, irregularly branching nuclei. This abnormal growth of the glandular epithelial cells can be traced in various stages from its beginning to the formation of definite carcinomatous masses. These are usually surrounded by the tuberculous tissue, but in some areas the growth of the carcinoma has exceeded that of the former, and the latter has broken through into the gland structure outside. Certain areas, therefore, show a well-marked growth of a carcinoma simplex. The study of the sections certainly tends to give the impression that the epithelioid growth is the primary condition; that secondarily to this a carcinomatous proliferation has been excited in those gland cells which have been separated from their normal relations with each other and with their basement membrane. The cells of epithelial origin can in all cases be easily separated from those of connective-tissue growth; their nuclei are larger, more uniformly oval, and contain much more chromatin, the cell protoplasm being more abundant and more granular. They do not bear any close resemblance to the epithelioid tissue surrounding them.

Carcinomatous proliferation is also found in several of the ducts surrounded by the hyperplastic basement membrane. The connective tissue of the organ is very œdematous and infiltrated throughout with leucocytes. The staining for tubercle bacilli was successful, but the germs were found in scanty numbers. The pus obtained from the wound was stained by Dr. Warden, without success. An examination of a small quantity sent to this laboratory showed a few beaded bacilli. A guinea-pig was inoculated with this pus, but its death and post-mortem occurred in my absence, and nothing definite was obtained.



Photograph of portion of section taken from Case II., showing the border between the carcinoma and the tuberculous zone. To the left is the epithelioid growth with numerous giant-cells (*a*); to the right is the carcinoma. Zeiss, 17 mm.

Case II.—Mrs. E. D., aged thirty-nine years, was admitted to the University Hospital on October 2, 1893. Her father died of "catarrhal inflammation" of the lungs. Her mother had lost two sisters and one uncle from "cancer." Otherwise the history is negative. Ten months before admission she had first noticed a small lump below the nipple. She had been struck at this point by the handle of a pitch-fork five months before. Her physician punctured the swelling and told her that she had an "enlarged milk gland." After the puncture the growth increased in size very rapidly, and gave her very severe pain. The breast was removed and the axilla cleared by Dr. Nancrede on October 5, 1893. The immediate result was good, but nothing has been heard from the patient since.

The breast and axillary glands were put into Müller's fluid, and not examined until nearly two years afterward. On cutting up the hardened material for class use it was found that both the mammary tumor and the axillary glands presented a unique picture of combined carcinoma and tuberculosis. The great mass of the tumor consisted of pure carcinomatous tissue, for the greater part a carcinoma simplex, but in many places of a medullary type. The tumor cells show large areas of simple necrosis, and there is a marked myxomatous degeneration of the stroma in many places. Around the periphery of the growth there is a broad zone of tuberculous tissue made up of miliary epithelioid tubercles. The majority of these show caseating centres. Between and around the nodules there is an abundant infiltration of lymphocytes. Giant-cells are very numerous, and are unusually large and prominent. For the most part they show caseating protoplasm and peripherally arranged nuclei. The tuberculous tissue and the carcinomatous growth are for the greater part distinctly separated from each other. Only in a few places do the carcinoma cells surround the tubercles, and there are no tubercles growing in the mass of tumor tissue. In the coarser trabeculæ extending into the tumor tubercles are found surrounding the remains of the gland structures. The chief growth of the tuberculous process is on the outside, and the carcinoma is practically surrounded by a zone of tubercles. That the carcinoma has been more rapid in its growth than the tuberculosis is evident by the compressed appearance of the outer zone, where the epithelioid nodules have somewhat of a concentric arrangement.

The appearance is the same as in the axillary glands. The greater part of each gland is made up of carcinomatous tissue, which is surrounded by a zone of tuberculous tissue made up of epithelioid nodules, showing caseation and containing many giant-cells. There is in all of the glands a preponderance of the tumor growth over that of the tuberculosis.

The staining for tubercle bacilli was negative. This may have been entirely due to the long period of hardening in Müller's fluid. The diagnosis in this case is, therefore, based wholly upon the histological appearances. The numerous miliary nodules of epithelioid tissue without bloodvessels, showing caseation centres and possessing numerous giant-cells having peripherally arranged nuclei, present a very characteristic picture.

The relations of the two processes appear to be very different from that in the first case described above. There the impression was obtained of a beginning carcinomatous process secondary to a primary tuberculosis; here the carcinoma appears to be the primary process and the tuberculosis the engrafted one. The appearances speak for a more recent infection of the latter condition, possibly at the time of the exploratory puncture. The relations of the two processes in Case II. appear to me to be wholly accidental, while, on the other hand, the study of the conditions in Case I. inclines me to the belief that there may be some definite etiological relation between the two processes.

The doctrine set forth by Rokitansky that carcinoma and tuberculosis are never found together, or, as later modified by Dittrich and Martius, that both of these processes never appeared in the same organ, has been overthrown by numerous observations. Lebert, Virchow, Wagner, Friedrich, Weber, and many others have shown the coexistence of the two processes in the same individual, while other investigators have found it to occur in the same organ. Friedländer, Wolf, and Schwalbe have described the occurrence of carcinoma in lung caverns in cases of chronic pulmonary tuberculosis.

Lubarsch found multiple carcinomata of the ileum showing tuberculous infiltration, primary lung carcinoma in chronic pulmonary tuberculosis, and metastatic carcinoma in areas of fresh tuberculous infiltration of the lung. Zenker affirmed that there was no local immunity, and reported two cases of the presence of tuberculosis and carcinoma in the same organ. In one case of cancer of the larynx and in one of the œsophagus he found caseating miliary tubercles, and in the latter case demonstrated the presence of tubercle bacilli.

Cordua described a similar case. Crone found tuberculous tissue in a carcinoma of the larynx. Baumgarten saw tubercles in cases of cancer of the larynx and rectum. Friedländer claimed (but never published details) to have found tubercles in the scar of a rodent ulcer. Köster also claimed to have found tubercles in cancers of the lip and mammary gland, but no published reports exist of these.

Ribbert believed that he had seen the histological structure of tuberculosis in eleven cases of carcinoma, six of the lip, and one of the mouth, tongue, gum, eyelid, and penis. His diagnosis was made chiefly upon the presence of giant-cells, and is not conclusive.

Crawford described a scirrhus of the mamma associated with an abscess. No giant-cells or bacilli were found in the gland, but the axillary glands showed a characteristic picture of both tuberculosis and carcinoma. The positive diagnosis of tuberculosis is lacking in this case.

In 495 cases of tuberculosis and 111 cases of cancer Loeb found thirty-one cases of the coexistence of the two diseases in the same individual. Clements reports three cases—carcinoma of the lower jaw with tuberculosis of the cervical glands; carcinoma of the mamma with tuberculosis of the axillary glands on the same side, and cancer of the stomach with tuberculosis of the liver. He also reports a case of endothelioma of the parotid combined with tuberculosis.

Numerous observers have described cases of lupus combined with epithelioma. It would seem that while the coexistence of tuberculosis and cancer is rare, it is found more frequently in the skin than elsewhere.

Sarcoma have also been found combined with tuberculosis, and Reich has described a case of brain tumor in which there was the picture of the combination of tuberculosis and glioma.

Over the question of the relation between the two conditions very different views are held. In the various cases of lupus carcinoma that have been studied the majority of observers believe that the tuberculosis is primary, and is the exciting cause of the carcinomatous proliferation. Crone holds that tuberculosis acts as an irritant and lessens the resistance of the tissue, so that specific tendencies toward the formation of carcinoma are excited. Zenker believes in two possibilities: either the tubercle bacilli act as a chronic inflammatory irritant and lead to epithelial proliferation, or the necrotic tumor tissue becomes the point of entrance of infection by the tubercle bacillus.

On the other hand, Cordua and Baumgarten believe that in their cases the carcinoma is the primary and the tuberculosis the secondary condition. Cordua is of the opinion that tubercle bacilli passed from the diseased lung into the œsophageal carcinoma by way of the lymph vessels. Köster also looked upon the tuberculous process as a secondary infection of the carcinoma.

While it cannot be denied that a primary carcinoma may later be infected, it is also believed by many competent observers that lupus carcinoma is a secondary development on a tuberculous foundation. The question then arises if this same relation may not be found in cases of coexistence of the two processes in other organs. According to Ribbert, the primary nature of the carcinoma in the cases of Cordua and Baumgarten is not strongly evident, and in his own cases he holds that the tuberculosis is the exciting cause of the carcinomatous growth. This belief he bases upon his own peculiar theory of the origin of carcinoma. In brief, he holds that all epitheliomata arise from a connective-tissue growth beneath the epidermis, by which a subepithelial granulation tissue is formed. This grows outward, causing a lengthening of the papillæ. Connective-tissue cells penetrate between the epithelial cells, push them apart, and isolate them. In these isolated groups of epithelial cells a proliferative tendency is set up, so that they grow and penetrate into the deeper parts of the tissue, thus giving rise to a carcinoma.

This, according to Ribbert, is the condition in lupus carcinoma. In lupus there is a subepithelial granulation tissue produced by the chronic inflammatory process set up by the presence of the tubercle bacilli. As the result of the outgrowth of this granulation tissue there is a lengthening of the papillæ, and in this growth epithelial cells may be separated and so lead to the appearance of carcinoma. Believing that the origin of lupus carcinoma may be explained in this way, Ribbert endeavors to extend this theory to the combination of the two processes in other organs, and looks upon the carcinomatous growth as the result of the tuberculous process. If the tubercles are very small, or even fail, he holds it as conceivable that the carcinoma exceeded the tuberculosis in rapidity of growth.

In his investigations over the histogenesis of cancer he many times observed the presence of giant-cells in the connective-tissue stroma of cancers. He mentions eleven cases of carcinoma in which these giant-cells were found (see above), and from the presence of these cells and the nodular appearance of the tissue in which they were found he makes a diagnosis of tuberculosis. He was unable to find tubercle bacilli. He excludes the possibility of the giant-cells being caused by lepra-bacilli, actinomyces, syphilis, animal parasites, or foreign bodies. He does not believe that they are formed as a reactive proliferation of the tissue against the in-growing epithelium, and from the conditions present does not believe that the epithelial cells act as foreign bodies upon the cells of the tissue. He further believes that they are not formed by cancerous proliferation. Having thrown out everything else by exclusion, he fixes upon tuberculosis as the cause of their formation. Even without the formation of definite nodules, he is inclined to look upon the presence of the giant-cells as evidence of the tuberculous nature of the process. He further confirms Köster's observations over the presence of tubercles in cancer.

The question, then, arises, What is the relation between the carcinomatous and tuberculous processes? It is possible, as Cordua affirmed, that the tuberculosis is secondary, and is the result of infection from the outside world, or comes from other parts of the body through the lymph vessels. Moreover, bacilli circulating in the blood may grow in the carcinoma as the place of least resistance. This is especially likely to happen in individuals having tuberculosis in other parts of the body.

On the other hand, the tuberculosis may be the primary condition. Ribbert believes this to be conclusively proved in two of his cases by the early stage of the carcinoma and the greater growth of the tuberculosis. In other cases he thinks the growth of the carcinoma has outstripped that of the tuberculous process. Taking all in all, he believes that the position that the carcinoma is the secondary process is better supported than the opposite view, and that, as in lupus carcinoma, the development of a subepithelial granulation tissue produced by the tubercle bacillus favors the formation of carcinoma according to his theory of the formation of epithelial tumors. He also points to the fact that lupus frequently produces epithelial formations of a benign character, and thinks it possible that these may be an early stage of carcinoma which later become malignant, just as other benign epithelial growths may become malignant.

He explains the fact that carcinoma so rarely develops in tuberculous individuals by the rapid caseation and ulceration which are the most common features of tuberculous processes; and that the tubercle bacilli rarely produce such chronic changes as in lupus, where the conditions harmonize with those necessary for his view of the origin of carcinoma. Ribbert, therefore, sums up the matter as follows: "That tuberculosis, in a part of the cases of carcinoma, is that agent which excites the subepithelial proliferation which is the foundation of the origin of carcinoma. In other cases other inflammatory agents may come into play."

Loeb believed that the combination is only accidental, but recognizes the possibility of the origin of carcinoma through the agency of the tubercle bacillus. He also holds it as undoubted that the cachexia of cancer prepares a suitable soil for tuberculous infection.

Lubarsch, basing his statements upon the findings of 6536 autopsies, found that the combination of the two diseases is not rare, but that it occurs significantly with greater rarity than each condition alone. He found that carcinoma occurred three times more frequently in non-tuberculous individuals than in those having tuberculosis, and that in non-carcinomatous individuals the occurrence of tuberculosis is more than twice as frequent as in carcinomatous. He gives five possibilities of the combination of the two conditions:

1. Purely accidental. Half of all the cases fall into this category.

2. Metastatic carcinoma in or near old or fresh tuberculous processes. Through the cachexia of cancer new tuberculous eruptions may follow old lesions. Such cases are not rare.

3. A fresh infection of tubercle bacilli may occur in a well-developed carcinoma. These cases are rare. He could find but three cases in his material.

4. A carcinoma may arise in a progressive chronic tuberculosis. The tuberculous process acts as the predisposing cause in a manner similar to that of acute or chronic trauma in favoring the development of carcinoma.

5. The hypothetical entrance of both conditions at once. He was not able to confirm this clinically or anatomically.

To explain the relative rarity of the coexistence of the two processes Lubarsch believed that age was not a sufficient factor, but that possibly the blood or tissue juices showed fine chemical changes which hindered or influenced the development of tubercle bacilli or other organisms. Other acute infections are also rarer in carcinomatous individuals than in non-carcinomatous individuals of the same age. That important blood changes do take place in carcinoma is well known, and it seems probable that such changes must have some significance in the relation of the body to infective agents.

Zenker, Loeb, and Cordua in essential confirmed Lubarsch's conclusions, and only Ribbert opposed them with any force. Basing his claims upon the views given above, he again asserted that the tuberculous process could be a direct etiologial agent in the production of carcinoma.

Clements criticised Ribbert's diagnosis of tuberculosis from the presence of giant-cells alone. His three cases mentioned above he puts into the first and second category of Lubarsch. He sums up with the statement that the coexistence of tuberculosis and carcinoma in lymph-glands is the result of a cancer metastasis, and that carcinoma predisposes locally to the excitation of a latent tuberculosis. In consequence of this local predisposition tuberculosis may develop in rare places as the liver and axillary glands, the advent of the tumor in the tuberculous gland giving the picture of an infection of the carcinoma with tuberculosis.

Schwalbe believes that in his case the tuberculosis is the older process and puts it into the fourth category of Lubarsch. He opposes Ribbert's theory, and holds that there is no etiological relation between the two processes.

To return to my own cases, the histological appearances in Case I. certainly seem to bear out Ribbert's view, and lead me to believe that here, as in lupus, the tuberculous process may act as the primary factor in changing the normal environment of the gland cells, and so exciting in them specific tendencies toward carcinoma. But I have never seen a similar case, and must believe that the relation is an extremely rare one, and cannot accept any broad application of it in the explanation of the etiology of carcinoma. Moreover, I must agree with those who have criticised Ribbert's diagnosis of tuberculosis as being inadequate and unsatisfactory. The close etiological relation of the two conditions yet remains to be proved.

My second case I should put into the third category of Lubarsch, and consider the tuberculous process to be a secondary infection of a carcinoma. As stated above, the infection may have occurred at the time of the puncture. The metastasis into the axillary glands I also consider to be later than that of the carcinoma.

In conclusion, I should say that the coexistence of tuberculosis and carcinoma of the mamma is a rare condition, and may be purely accidental, or the tuberculous process may appear to be the exciting cause of the carcinomatous proliferation.

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CONCERNING KERNIG'S SIGN IN MENINGITIS.[1]

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IN 1884 Kernig,[2] of Russia, described a phenomenon which he thought was found only in affections of the pia mater, and which was never lacking in inflammations of that membrane. If a patient with meningitis be made to sit up, as on the edge of the bed, the thigh therefore being at a right angle with the body, it is found extremely difficult to extend the leg because of the presence of a marked flexor contracture. To quote Kernig: "The phenomenon is so striking, the difference between nothing and something ('zwischen null und etwas'), between the complete absence of the contracture while the patient is lying down, and its presence when the patient sits up, is so plainly perceptible that it is well worth while to pay special attention to this symptom and to examine for it in every case."

Kernig saw fifteen cases of meningitis, in all of which he found the symptom. In eight cases there was confirmation of the diagnosis by autopsy. Of the fifteen cases thirteen were epidemic cerebro-spinal meningitis, one tuberculous, one suppurative. Kernig failed to find the sign in many diseases other than meningeal affections. In six cases, however, where there was not acute meningitis, the sign was more or less marked; yet in all these he found some pial trouble—œdema, intermeningeal hemorrhage, circumscribed meningitis, chronic meningitis, general carcinosis. Kernig believed the sign appeared in meningitis as early as the rigidity of the neck, and that it is late to disappear.

Kernig's sign seems to have attracted comparatively little attention for fourteen years. Most of the standard text-books on nervous diseases make no reference whatever to it. Some authors describe the phenomenon, but disclaim any individual responsibility for the correctness of the statement by bracketing Kernig's name after the statement (*e. g.*, Oppenheim). Still others state briefly that it is rarely found. "A peculiar, but as it appears extremely uncommon, symptom is the so-called flexor contracture of Kernig." (Hirt, p. 14.) Until Netter, in 1898, revived interest in the subject there are, so far as I can discover, but four writers who recorded the results of their clinical observations on this phenomenon: Bull (1885), Henoch (1886), Friis (1887), and Blümm (1889).

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[1] Read at the fourteenth annual meeting of the Association of American Physicans, at Washington, May 2, 1899.

[2] Kernig: Berliner klinische Wochenschrift, December 29, 1884.

Bull[1] wrote to show that the sign was not pathognomonic of meningitis or even of pial trouble, but merely indicated an increase in intracranial pressure. He found the flexor contracture in three cases, one of tuberculous meningitis with no autopsy, one of solitary tubercle of the cerebellum, but "in the pia over it a few miliary tubercles," with tuberculosis in the lung, lymph-glands, kidney, and intestine; one of otitis media with caries of petrous portion, thrombosis of transverse sinus, and common jugular. In the basal pia, especially over the frontal lobe, were ecchymoses, and there were a few teaspoonfuls of serum in the posterior fossa. These cases, it seems to me, go rather to prove Kernig's statement, that his sign is found with affections of the pia mater, than Bull's, that it is not indicative of meningitis or even of involvement of the pia; for, on Bull's own showing, one of his three cases was tuberculous meningitis, another had miliary tubercles in the meninges, the other certainly some local meningitis, with numerous ecchymoses and an unusual amount of serum.

The most extended observations are those of Friis,[2] of Copenhagen. During an epidemic of cerebro-spinal meningitis the examination for Kernig's phenomenon was made in sixty out of 110 cases. In fifty-three of the sixty the sign was present—*i. e.*, in 88 per cent. In two of the remaining seven it was doubtful, in two the examination was unsatisfactory, in three the sign was absent. Friis was unable to state how early it appeared or how late it remained. He found no relation between it and stiffness of the neck, hyperæsthesia, or pain, though he was inclined to think it was more pronounced where lumbar pain was most complained of. Friis has no explanation to offer as to the cause of the phenomenon, but does not agree with Bull in regarding it as due solely to intracranial pressure, as he has seen it absent in a case of hydrocephalus.

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[1] Eduard Bull: Berliner klinische Wochenschrift, 1885, No. 47, p. 772. Ueber die Kernigsche Flexionscontractur der Kniegelenke bei Gehirnkrankheiten.

[2] Albert Friis: Om den i Kjobenhavn i Aaret, 1886 Herskende Epidemi af Meningitis Cerebrospinalis. Thesis, 1887, p. 154.

In an epidemic in Copenhagen in 1891 Friis[1] found the sign in twenty-one of twenty-six cases (80 per cent.).

Henoch,[2] in 1886, reported on the Kernig sign. His later views can be gathered from his reference to it in his *Kinderkrankheiten*, seventh edition, p. 320. He has found the Kernig contracture present in many cases of meningitis, but does not regard it as pathognomonic, as he has in at least one case with autopsy found no contracture; and he thinks it may be present without meningitis.

Blümm[3] found Kernig's sign in seven out of nine cases of meningitis.

Last year, 1898, Netter,[4] in examining twenty-five cases of meningitis, found Kernig's sign present in twenty-three (92 per cent.), some cases abortive, others advanced, two convalescent. Eight cases were tuberculous, three mixed tuberculous and epidemic, twelve epidemic. One of the exceptional cases was a child seen but once, the other a child living at the time of the communication with evidences of advanced tuberculous meningitis. Netter believes its presence permits one to assert quite positively the existence of a meningitis. He regards it as of especial value in the diagnosis of abortive types of epidemic meningitis. From its persistence into convalescence (Kernig, Henoch, Netter) it may be of service in enabling one to make a retrospective diagnosis.

A still more extended experience with forty-seven cases is reported by Netter.[5] He found the test positive in about 90 per cent. of cases of meningitis.

My own observations have been made upon nineteen cases of meningitis, with autopsy in eight cases. All doubtful cases have been excluded. Nine were epidemic cerebro-spinal meningitis, seven were tuberculous, two were pneumococcal, one was syphilitic with an acute process superadded. These cases, for convenience of reference, have been arranged in tabular form. I take this opportunity of thanking the physicians who gave me the opportunity of examining some of their patients, and in particular Drs. Billings and Preble, who courteously extended to me the freedom of their wards at the Cook County Hospital.

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[1] A. Friis: Ugeskrift for Laeger, 1892, pp. 407 and 431, cited by Netter.

It is interesting to note that in studying these cases Friis found and described an intracellular diplococcus evidently the intracellularis. His figure on page 27 of his thesis is an excellent representation of the specific organism. He does not, however, declare it to be the specific germ, though questions its identity with Fränkel's pneumococcus.

[2] Henoch. Charité Annalen, 1886, p. 575.

[3] Blümm: Münch. med. Woch., June 25, 1889.

[4] Netter: La Semaine Médicale, 1888, p. 281. Clinical lecture delivered at Hôpital Trousseau.

[5] Bulletin et Mémoires de la Société Médicale des Hôpitaux de Paris, 22 Juli, 1898. Abstract in Deut. Med. Woch., Jan. 26, 1899.

TABLE I.—SHOWING CASES OF MENINGITIS EXAMINED FOR KERNIG'S SIGN.

No.	Date.	Name, age, sex.	Where seen.	Day of disease.	Clinical symptoms.	Kernig's phenomenon.	Result.	Autopsy.	Remarks.
1	Sept. 30, 1898	.... adult, F.	C. C. Hospital, Dr. Preble.	?	Fever, delirium, rigid neck, swollen joints, paralysis of some of ocular muscles.	Marked.	Died.	Pneumococcus septicæmia, with suppurative arthritis, pericarditis and meningitis	
2	Oct. 7, 1898	? adult, color'd, M.	C. C. Hospital.	12th	Old cough, slightly dull at one apex. chest elsewhere hyper-resonant, emaciation, cyanosis, rapid respiration, fever, delirium; T.B. in sputum. Diagnosis: miliary tuberculosis. On Oct. 5th, no rigidity of neck and no Kernig; on Oct. 7th, neck rigid and retracted, and Kernig pronounced.	Marked; can lift patient from bed without the knees yielding in extension.	Died.	No autopsy.	Of interest to note absence of Kernig at first, but appearance later as evidence of meningeal involvement became marked.
3	Oct. 16, 1898	R. adult, M.	Drs. McNeal and Heywood.	8th	Headache, vomiting, temp. 99–102°, delirium, insomnia, involuntaries; no spleen; neck rigid, facial paresis; no evidence of syphilis, no benefit from iodides.	Present.	Died.	No autopsy.	Meningitis, probably tuberculous.
4	Oct. 30, 1898	.... Adult, color'd, M.	C. C. Hospital.	?	Fever, semicoma, rigid neck, right ptosis, etc. Diagnosis: Tuberculous meningitis.	Present.	Died.	Autopsy: tuberculous meningitis.	
5	Nov. 15, 1898	Willie, 10 yrs. M.	C. C. Hospital.	9th	Headache, delirium, later coma; strabismus, rigidity and retraction of neck, unequal pupils, neuro-retinitis, temp. 99–101°, herpes labialis.	Present.	Died.	Autopsy: meningitis.	Nature of meningitis not determined bacteriologically; probably epidemic.
6	Dec. 2, 1898	.... adult, M.	C. C. Hospital.	?	Alcoholic and syphilitic; headache, thick speech, rigid neck and jaw, involuntaries, emaciation, cyanosis, rapid respiration. A micrococcus in smears from lumbar puncture.	Present.	Died.	Autopsy: syphilitic meningitis with acute process superadded.	

7	Dec. 6, 1898	M. 48 yrs. M.	C. C. Hospital.	?	Brought in unconscious; temp. 101°, hyperæsthesia, rigidity of neck; diplococcus by lumbar puncture; mind clearer after lumbar puncture.	Marked.	Died.	Autopsy: cerebro-spinal meningitis.	
8	Dec. 17, 1898	W. 4 yrs. F.	Dr. Pigall.	14th	Prodromal irritability, headache; five days ago convulsion; later rigid and retracted neck, and coma; pupils unequal; Cheyne-Stokes respiration, emaciation, patellar reflexes slightly exaggerated.	Not present, or very slight	Died within a few hours after examination.	No autopsy.	Diagnosis: tuberculous meningitis.
9	Jan. 11, 1899	……… 25 yrs. F.	Dr. Urheim.	7th	Empyema one year before; operation; two later operations, but sinus still remaining; for several days headache, bewilderment, delirium, temp. 100°; no rigid neck or paralysis at time of examination.	Present.	Died two days later.	No autopsy.	Probable tuberculous meningitis secondary to primary pleural tuberculosis.
10	Jan. 16, 1899	S. 3 yrs. M.	Dr. McCullough	8th	Influenza, pneumonia, suppurative otitis; for about four days stupor; temp. 100 to 104°; constipation, retention of urine; neck retracted and stiff; lung still consolidated; no paralysis, but great laxity of all muscles; only by severe pinch or firm supra-orbital pressure can even a slight turning of the hand be produced; no patellar reflexes.	Not present in right leg, in left very slight.	Died 20 hours after examination.	No autopsy.	Pneumonia, metapneumonic otitis and meningitis.
11	Feb. 20, 1899	B. B. 27 yrs. F.	C. C. Hospital.	Several	Two years ago nursed husband with consumption; one year ago pleurisy. Before admission severe headache and convulsions, delirium, strabismus, retinitis, retracted neck, "ganglion" on hand; lumbar puncture negative; cyanosis, rapid respiration, tender abdomen, temp. 99–102°.	Present.	Died.	Autopsy: old tuberculous pleurisy, solitary tubercles in brain, with general miliary tuberculosis; some small tubercles in meninges.	
12	Feb. 22, 1899	……… adult, M.	C. C. Hospital, Dr. Billings.	Several	Sore-throat, headache, delirium, herpes, petechiæ, retracted neck, diplococcus intracellularis from cerebro-spinal fluid; coma on eighth day.	Marked.	Died.	Autopsy: epidemic cerebro-spinal meningitis.	
13	Feb. 26, 1899	S. 17 yrs. F.	Dr. T. E. Roberts	17th	Tuberculous family history; prodromal irritability of temper; headache, becoming extremely severe and constant, temp. for 17 days 99–103°; delirium, retraction of neck, variable pulse, ptosis, Cheyne-Stokes, coma, rapid pulse; no spleen, spots or Widal.	Present in lt. leg; in rt. leg, by constant, gentle force, the leg straightens out, giving way with a sort of snap.	Died, 56 hours after examination.	No autopsy.	Diagnosis: tuberculous meningitis.

No.	Date.	Name, age, sex.	Where seen.	Day of disease.	Clinical symptoms.	Kernig's phenomenon.	Result.	Autopsy.	Remarks.
14	Mar. 22, 1899	A. L. 8 yrs. M.	Presb. Hosp., Dr. Cotton.	20th	Headache, vomiting, delirium, rigid neck, coma, variable pulse; temp. 99–103°+; leucocytosis (22,000); lumbar puncture negative; great emaciation.	Present continuously from Mar. 22 to May 2.	Recov., with deafness.	....	Diagnosis: epidemic cerebro-spinal meningitis
15	Mar. 24, 1899	V. 25 yrs. F.	C. C. Hospital, Dr. Roberts.	7th	Headache, tender and rigid neck, muscular twitchings, tâche cerebral, delirium; temp. 100–104°; lungs, heart, etc., negative.	Marked.	Died.	No autopsy.	Diagnosis: meningitis, probably epidemic.
16	Mar. 24, 1899	W. B. adult. M.	C. C. Hospital, Dr. Preble.	?	Coma, restless, rigid neck, slight ptosis; temp. 103–104°, pulse 66–88, albumen; an abundant diplococcus by lumbar puncture.	Marked; Kernig also present just before death, though not as marked as day before.	Died.	No autopsy.	Epidemic meningitis.
17	Mar. 25, 1899	C. R. 41 yrs. M.	C. C. Hospital, Dr. Billings.	?	Headache, slight rigidity of neck, stupid even to falling out of bed, involuntaries; temp. 98–100°; diplococcus by lumbar puncture.	Present.	Recov.	....	Probable epidemic meningitis.
18	Mar 26, 1899	Geo. S. color'd, 30 yrs. M.	Dr. F. B. Earle.	29th	Onset with headache, vomiting; delirium, retracted and rigid neck, pulse rarely over 100, temp. 97–104°, involuntaries, resp 24–34; no cyanosis, leucocytosis; no plasmodia, no Widal.	Present.	Recov.	....	Epidemic cerebro-spinal meningitis; on May 1st, there was no Kernig present; patient able to walk.
19	April 2, 1899	N. 2½ yrs. F.	Dr. Pigall.	3d	At first feverish, wanting to lie down; mother thought "bilious" and gave oil; next day convulsions and fever, stupor, "gritting of teeth," jerkings, coma, eyes half open, left eye reddened and with muco-pus on globe, neck rigid when attempt is made to move it, and whole body then quivers; temp. 102°+; pulse 160, respiration irregular, lungs negative.	Present.	Died, in 12 hrs.	No autopsy.	Meningitis, probably epidemic.

From the table it will be seen that Kernig's sign was present in seventeen out of nineteen cases of meningitis, or in 89.4 per cent. In the two cases in which it was absent, both children, the single examination was made a short time before death, and it was noticed at the time that there was a general marked laxity of all the muscles, in the one case there being but the faintest movement of an arm in response to firm and long-continued supraorbital pressure. This recalls the fact that even the retraction and rigidity of the neck muscles may be variable, and just before death may entirely disappear. "In patients deeply comatose and shortly before death I have frequently seen the stiffness of the neck disappear."[1] Kernig's sign may have been present earlier. Friis states that it may vary in degree from day to day. In most of the cases examined the other signs were so unequivocal as to make the examination for the Kernig phenomenon wholly unnecessary except as a confirmatory finding. In some of the cases, however, its presence was of distinct value from the paucity of the common evidences of meningitis—*e. g.*, in cases three and nine. And in case two—one of miliary tuberculosis—it was of special interest to note the absence at first of Kernig's phenomenon and its later appearance at the same time with the other evidences of meningeal involvement—retraction and rigidity of neck, severe headache, paralysis of ocular muscles.

Netter,[2] in a footnote, cites an extremely instructive case showing the value of the Kernig phenomenon. In a typhoid with typical symptoms, including the agglutination test, Kernig's sign was marked. But from the absence of other pronounced meningeal symptoms meningitis was excluded. Death occurred in the third week from perforation. The autopsy revealed typhoid, and also a cerebro-spinal meningitis due to the staphylococcus pyogenes and the bacillus typhosus.

Many patients with diseases other than meningitis were examined as to the existence of Kernig's phenomenon, there being selected as many cases as possible in which there were cerebral symptoms. Many individuals of all ages who were in apparently perfect health were examined. In twenty-five healthy individuals selected at random no Kernig sign was present. In 100 cases of disease other than meningitis Kernig's sign was absent in ninety-eight and present in two. The result is shown in the following table:

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[1] Eichhorst. 4th edition, iv. 473.

[2] Netter. La Semaine Méd., 1898, p. 282.

TABLE II.—SHOWING CASES OTHER THAN MENINGITIS EXAMINED FOR KERNIG'S SIGN.

No. of cases examined.	*Diagnosis.*	*Kernig's phenomenon.*
25	Healthy individuals from infancy to old age, both thin and fleshy	Absent.
5	Pneumonia	"
3	Convalescent pneumonia	"
2	Pneumonia with delirium tremens	"
5	Delirium tremens	"
1	Tetanus; fourteen days after injury, trismus, convulsions, fever, mild delirium	"
2	Uræmia	"
3	Malaria	"
1	Convalescent malaria	"
3	Typhoid fever	"
5	Cerebral hemorrhage	"
1	Cerebral thrombosis	"
3	Cerebral syphilis	"
1	Tumor of brain	"
1	Subdural hemorrhage (autopsy)	Present.
1	General paralysis of insane	Absent.
1	Multiple sclerosis with spasticity	"
1	Ataxic paraplegia	"
2	Convalescent multiple neuritis	"
1	Tabes and hysteria.	"
2	Hysteria	"
1	Incipient Graves's disease	"
2	Lead poisoning	"
1	Opium poisoning	"
1	Influenza with cerebral symptoms	"
1	Pernicious anæmia	"
2	Chlorosis	"
1	Enteroptosis	"
4	Acute rheumatism	"
4	Chronic rheumatism	"
1	Gonorrhœal rheumatism (vide text)	Present.
10	Valvular disease of heart	Absent.
1	Fibrous myocarditis	"
1	Acute endocarditis.	"
5	Carcinoma of stomach	"
2	Ulcer of stomach	"
3	Asthma and bronchitis	"
1	Mastitis	"
1	Chronic nephritis	"
1	Amœbic dysentery	"
6	Pulmonary tuberculosis	"
1	Pelvic inflammation	"
1	Facial erysipelas with delirium, vomiting, high fever, headache, etc..	"
1	Loose body in knee-joint	"
1	Chronic gastritis	"

In a case of Dr. Billings, Kernig's sign was present where post-mortem a subdural hemorrhage was found with no inflammatory changes. The patient was a laborer, aged fifty-two years. Headache and forgetfulness for a few days. Found unconscious, having apparently fallen out of bed. Rigid and retracted neck, equal pupils, right facial paresis, right arm flexed and rigid. Involuntaries. Temperature on admission normal, but in twenty-four hours up to 104°, with pulse 130. After lumbar puncture temperature 98°, pulse 56. Later temperature but slightly elevated. Pulse variable. Mental condition varied from coma to quite bright intelligence. When ratonal no rigidity and no Kernig sign. When comatose Kernig's sign present. Died in coma on fourteenth day. Autopsy revealed subdural hemorrhage, left side.

It was present in the unaffected leg in a woman who had been lying in bed for four weeks with a gonorrhœal arthritis of one knee. During this time she had lain with both knees flexed, as this was the most comfortable position. This local condition may explain the difficulty experienced in making extension in the leg so long accustomed to flexion.

The absence of the sign was of diagnostic value in the case of facial erysipelas. The patient, an adult, went to work in the morning, feeling nearly as well as usual, and returned at noon complaining bitterly of headache and nausea. "He staggered into the house like a drunken man." By 3 P.M. he was delirious, and his physician found a temperature of 104°, with, he thought, some stiffness of the neck, and diagnosed meningitis. When I saw him the next day there was still complaint of severe pain in the head; he had not slept the night before; was slightly delirious; temperature 103°. Other findings in the lungs, heart, abdomen, muscles, negative, save that breathing through the nose was difficult, as the nose seemed "stuffed up" as from a cold. There was no Kernig sign, though the patient, a fleshy man, and his wife both said they knew he would be unable to extend the leg as he sat on the edge of the bed, as he had tried it many times in his efforts to put on his shoes and stockings. In one leg extension was made with some little difficulty, but still with sufficient ease to exclude Kernig's phenomenon—a strong argument, it seemed to me, against meningitis. The next morning the nose and adjacent skin of the face showed typical erysipelas, and the case was clear, though the prevalence of sporadic cases of epidemic meningitis made one at first seriously consider the possible existence of this affection.

From the study of cases made by Kernig, Bull, Henoch, Friis, Blümm, and Netter, with the observations just recorded, it seems justifiable to regard Kernig's phenomenon as present in the majority of cases of meningitis—say 80 to 90 per cent.—and as only exceptionally present in other affections. Other and more definite conclusions concerning it seem unwarranted at present. That it may occasionally be absent in meningitis and occasionally present in diseases other than meningitis should not cause it to be wholly discarded as of no value. The truly pathognomonic symptoms are few. Rose-spots in typhoid, herpes in malaria and pneumonia, absence of free hydrochloric acid in carcinoma of the stomach, murmurs in endocarditis, choked disk in cerebral tumor, and scores of other symptoms are not pathognomonic, but rightly deserve attention, when found or when absent, as helping to make up or modify the symptom-complex of a disease, the method of diagnosis upon which as yet clinicians are compelled largely to rely.

As to the technique of eliciting this sign, it is exceedingly simple. The patient may be made to sit up on the edge of the bed with the legs hanging down, thus bringing the thigh at right angles to the body, when extension of the leg can be attempted; or the thigh can be brought at right angles to the body as the patient lies in bed on the side, or preferably on the back, and the leg then extended. The only requirement seems to be that the thigh should be placed at a right angle with the body before the attempt is made to extend the leg. Not infrequently in delirious patients—*e. g.*, in delirium tremens—a little, patient, gentle force must be used before the jerking and tense muscles yield. The same is true of some spastic conditions. But where Kernig's contracture is present patience and gentleness do not cause the muscles to yield, and the back of the patient can generally be lifted from the bed without the knees giving way. This procedure is often accompanied by evident pain to the patient. In some cases the leg and thigh will make an obtuse angle of no more than 110° or 120°. As Kernig says, the test in many cases is most striking, particularly in those patients where thigh and leg in the recumbent position are extended and apparently lifeless, but in the test position reveal a most intensely rigid contracture, often with evidence of acute pain. In testing for Kernig's sign there must be excluded those cases in which local causes could interfere with the proper extension of the leg, such as rheumatic or other form of arthritis of the hip or knee, myositis, old contractures from nervous diseases, and sciatica. The phenomenon can be well imitated by the latter condition.

No thoroughly satisfactory explanation of this phenomenon has been offered. Bull's notion that it is merely an evidence of increased intracranial pressure is disproven by the many failures to find the sign in hydrocephalus, in tumors, and in hemorrhage. His notion is, further, that it is but an exaggeration of a normal condition. Even in health it is often somewhat difficult to secure easy and complete extension of the leg with the thigh flexed at right angles with the body, owing to the tenseness of the muscles at the back of the thigh. Henoch[1] aptly cites the statement of Landois that the flexors of the leg springing from the tuber ischii are too short to permit of free extension of the leg when the thigh is flexed on the body at an acute angle, and he further calls attention to the fact, noted by Henke,[2] that owing to the shortness of their muscular fibres and the abundance of tendinous fibrous material the semi-tendinosus, semi-membranosus, and biceps femoris are unable to stretch far enough to permit of complete extension of the leg when the thigh is sharply flexed on the body. It is easy to assume, therefore, that in meningitis there is such an increase in tone as to exaggerate this natural difficulty of extension into a contracture of the flexors of the leg. But just how this is brought about is a matter of speculation.

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[1] Loc. cit.

[2] Henke. Hand Atlas, Berlin, 1888, i. 175.

ON ASTASIA-ABASIA, WITH A CASE.

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It is a remarkable fact that the syndrome astasia-abasia has attracted so little attention in America. The earliest account of the condition, according to Knapp,* was given by Jaccoud in 1864. Weir Mitchell, in 1881, reported a case under the heading "Hysterical Motor Ataxia." Knapp's very complete paper was published in 1891. Up to that time he had been able to collect only forty-nine cases, in addition to his own, which presented "some of the symptoms of abasia, but which is not wholly typical." Of these cases thirty had been reported by French observers, and only four had been studied in this country. These were: 1. The case of Weir Mitchell, already referred to (1881). 2. That of Hughes (1890). 3. That of Hammond (1891). 4. That of Knapp (1898). Dr. Kalteyer has been good enough to look up for me the references to this curious and rare nervous disturbance since the date of Knapp's paper. He finds in the *Index Medicus* forty-three separate titles. Of these communications twenty-two are by French or Belgian and five by American physicians. The American papers are those of: 1. M. Prince (1892); 2. Bremer (1893); 3. F. R. Smith (1894); 4. Eshner (1896); 5. Diller (1896). To the nine cases hitherto reported by American observers I desire to add one recently observed in private practice.

A woman, aged twenty-four years, of good position and in comfortable circumstances, is the subject of the following note: She comes of distinguished stock, but on the paternal side there is an uncle epileptic and an aunt addicted to morphine; on the maternal, two uncles dipsomaniacs. Her father was very successful in business, had grandiose ideas, and lost a large fortune. He is now greatly absorbed in tracing geneologies. Her mother died of diphtheria. She had a sister who died of diphtheria at an early age, and one older than she who is in excellent health, but excitable. The patient had the diseases of childhood severely, but grew up in good health. She has for some years, since the death of her mother, kept house for her father, who is much preoccupied, but she has had her own friends, and is very intelligent and cheerful. Lately there was an unsatisfactory love affair. Up to this time her health had been excellent. Early in January she began to suffer from bath pruritus. January 16th, being at the close of menstruation, she was roused from sleep at midnight by a ring at the bell. She hurried into her wrapper and slippers and opened the door to receive an indifferent telegram from a member of the family in another city. The next day, on attempting to rise, she found it impossible to stand or walk. With the assistance of her maid she could cross the room, but unsupported she sank to the floor. She described her condition in the following terms: "My left leg feels as though it were made of cotton"—an expression already recorded—and "I feel like a combination of a child learning to walk and a drunken woman." Her people were greatly alarmed, but she treated the matter lightly. In the course of a day or two the following clinical data were collected:

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* Journal of Nervous and Mental Diseases, New York, November, 1891, xvii. No. 11.

The patient stated, referring to her matrimonial engagement which had been broken off, that for some months prior to the attack she had been worried. She was slightly paler than usual, but refused to have a blood examination. She had menstruated regularly and without pain. Appetite fair; digestion satisfactory; bowels slightly constipated; up to this time vomiting had not occurred. There were no signs of visceral disease. The urine is normal. Lying in bed or seated upon a chair, the lower extremities presented nothing abnormal; motor power, freedom and precision of movement, and the muscular senses were unimpaired; knee-jerks decidedly increased; ankle clonus not present; the plantar reflex intact; electrical reactions normal. There was no rigidity, ataxia, or paralysis. Sensation to touch, temperature, and pain appeared to be unimpaired. The patient complains, however, of subjective sensations of numbness and pricking throughout the left lower extremity, including the foot, leg, and thigh. Similar sensations are referred to the foot and outer surface of the right leg, but they are not felt above the knee. Upon attempting to stand her legs bend under her, and unless supported she sinks to the ground. The irregular movements of the limbs are repeated much in the same manner at each effort to stand. They correspond closely to the description of Blocq.* There are abrupt movements of flexions of the knees, followed by rapid extension; these contortions necessitate compensatory movements of the upper extremities and the head in order to maintain the equilibrium. Upon attempting to walk with some support these difficulties are increased; the body is thrown forward, the thighs and knees are abruptly flexed, and then extended. These movements are wholly irregular. With some support she is able to move a short distance, but presently her legs bend under her and she sinks to the floor. She volunteers the statement that in order to obtain an article she desired she was able to cross the room upon her hands and knees.

The patient was kept in bed and not allowed to see members of her family or friends. Valerianate of zinc, in one-grain dose four times a day, was administered in gelatin-coated pills. She objected strongly to the odor of the pills, but nevertheless took them as prescribed. Once a day she had massage of the legs and feet for forty minutes; once a day faradism with the electrical brush for twenty minutes, the current falling just short of pain. At the end of two weeks she was allowed to get out of bed. The difficulty in standing and walking was much less. She was now given lessons in standing and walking. Her nurse was experienced and intelligent, and entered fully into the plan of the treatment. Improvement was rapid, and in ten days the patient was able to go about her room, and, assisting herself by the baluster, to go down stairs for a drive. In a few days the motor disturbance and the paræsthesia had wholly disappeared. About this time distinct hysterical phenomena—vomiting, intermittent tremor of the hands, vertigo, sensations of throbbing in the abdomen, emotional manifestations, weeping, and excitement without apparent cause—manifested themselves. There was no spinal tenderness; no tenderness over the so-called ovarian regions, and hystero-genetic areas were not found.

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* Paul Blocq. Revue Generale de Clinique et de Thérapeutique, March 14, 1889, vol. III. No. 11.

She was again isolated and placed under a systematic regimen. In the course of a month great improvement occurred, and it was thought well to send her to visit to some friends at a distance who knew nothing of her sickness or its cause.

This case corresponds to the description of the condition by Blocq, who, in 1888, collated the instances, numbering at that time eleven, and gave to the affection the name astasia-abasia, now generally received. This observer defined the condition as "a morbid state in which the impossibility of standing erect and walking normally is in contrast with the integrity of the sensibility, of the muscular strength, and of the co-ordination of the other movements of the lower extremities." (Knapp). With those who are familiar with Blocq's papers and that of Knapp it is quite unnecessary to discuss the theories of the causation of this condition. Church's statement that it is due to a systematized amnesia embodies that theory which is generally accepted. That astasia-abasia is not a nosological entity, but a syndrome, must be conceded. In the foregoing case it was a symptom of hysteria. That it is usually such a symptom, most of those who have seen cases believe. Osler speaks of it as "a manifestation of a neurosis allied to hysteria." Many of the cases have occurred in connection with organic disease. This fact does not militate against the hysterical origin of the condition, since cases of organic disease of the nervous system are often associated with hysteria.

In closing I would call attention to the expressions used by my patient in describing her condition: "That her left leg felt as though it was made of cotton," and that she "felt like . . . a baby learning to walk." It is very remarkable that this girl, who has no knowledge of medicine or medical books, should have used the very phrases so often encountered in the writings upon the subject and at once descriptive o the condition and suggestive in view of the generally accepted theory of its causation.

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EVERSION OR TURNING INSIDE OUT OF THE SAC OF A CYSTONEPHROSIS AS AN AID IN OPERATING UPON THE RENAL END OF THE URETER AND UPON THE PARTITION WALLS BETWEEN DILATED CALICES.

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I desire to describe a new method of systematic search for the ureteral opening on the inside of a cystonephrotic sac; not by "bisection," as I have described in the case of infected partial cystonephrosis,[1] but by eversion of the cystonephrotic sac through an opening large enough to permit of turning the wall inside out. This eversion of the cystonephrotic sac, combined with methodical consecutive division of the partition walls one after another, enables us gradually to lay bare and turn out for ocular inspection the whole inner wall of the sac. This is also a sure way of finding the renal orifice of the ureter. The division of the partition walls transforms the multilocular into a unilocular cavity, and facilitates drainage of urine down the ureter into the bladder.

This methodical eversion of the sac is new and superior to the method employed by Simon and, later, by myself, of inspecting the inner wall of the sac *in situ* through the opening in its wall by means of specula and reflected sun- or lamplight. This method also makes it much easier to find the ureteral orifice. I cannot see how the renal orifice of the ureter can escape being seen by this method. However, if it is nearly obliterated by stenosis from infection or inflammation, it might be impossible to see it even under these circumstances, and it might, therefore, become necessary to lay the ureter bare from below and outside of the sac, open the ureter by a small longitudinal incision, and pass a fine probe up into the sac as described by me in a former paper.[2]

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[1] Annals of Surgery, June, 1896.

[2] Journal of the American Medical Association, March 10, 1894.

Another advantage of the method of eversion is the ease and promptness with which the ureteral orifice is brought into the field of operation. We do not need to wait three months or more for retraction of the sac, and then bisect the kidney in order to find and operate on the ureteral entrance from within, but can accomplish all that is required in a single operation.

I do not, of course, know in what proportion of cases a cystonephrotic sac is so movable and so easy to handle that this eversion is feasible, but I think it likely that it would be the rule in cystonephrosis following or caused by a descended floating kidney, and would be the case as long as the cystonephrosis was aseptic—that is, not yet fixed to its surroundings by perinephritic inflammation from the infected contents of the sac.

The eversion proved in the following case to be a great help, and was probably the only means possible of finding and operating upon the renal orifice of the ureter.

CASE.—Miss C. W. was referred to me by Dr. J. V. Bacon for operation on February 21, 1898, and entered Passavant Memorial Hospital in my service. The patient was twenty-three years of age, American, single.

Family history: Negative, with the exception that her father passed stones with the urine thirteen years ago.

Personal history: Patient had the ordinary diseases of childhood, and, in addition, dysentery at the age of three years, and typhoid fever at the age of fourteen, complicated by hemorrhage from the bowels. At the ages of seven and twenty years she had attacks of jaundice, with nausea and vomiting, attended by slight elevation of temperature, but without pain in the epigastrium or the region of the gall-bladder. No clay-colored stools nor stones in the feces were observed. The second attack, in 1895, was characterized by a gradual onset of jaundice for a month, at which time she was most deeply jaundiced. This attack was attended by nausea and vomiting after all meals, and occasional nausea between meals. She was able to retain food by drinking lemon phosphate, obtaining in this way relief from the nausea. The jaundice and nausea continued until the spring of 1896. She lost some weight, but does not know how much. Since the spring of 1896 she has had no further nausea, jaundice, or other symptoms pointing to the biliary tract.

She had prolapse of the uterus at the age of fourteen, which continues to the present time. She gives no history of injury.

Present illness: In July, 1893, while at the World's Fair, the patient was seized with pain in the right mammary line an inch and a half below the costal arch. This pain came on very suddenly, was sharp, constant, and severe, and localized to an area the size of a silver dollar, and without radiations. Flexion of the right thigh caused the pain to increase in severity. She had no urinary disturbance at this time. Upon going to bed she found that while the pain lasted she could not lie on the left side, and that there was much tenderness on pressure over the painful territory, which did not alter upon change of posture from standing to lying down. There was no tenderness on pressure beyond the area of pain. After fifteen to thirty minutes in the recumbent posture she was entirely free from pain. During, before, or after the attack she does not think she had any chill or elevation of temperature. She perspired freely and felt faint during the attack.

For the two years following she had similar attacks varying in frequency from one in seven to fourteen days to several a day. Very soon after the first attack she noticed that certain bodily movements, such as elevation of the right arm above the head, flexion of the trunk to the left, or any movement that produced extension of the muscles on the right side brought on the pain. Most of the time she was forced to sleep with the right thigh semiflexed. Extension apparently caused a feeling of tension on the right side of the abdomen, and was followed by an attack. She found that lying down for fifteen or twenty minutes would give her relief from the attacks. By going to bed in the beginning of the attacks she was able to abort them or cut short their duration.

During or preceding attacks she had no unusual desire to pass urine, but a month or two after the first attack she noticed that about the time the pain subsided, or a few minutes thereafter, she had a desire to urinate and passed from two to four ounces, a smaller quantity than she ordinarily passed when feeling well. The urine was never stained with blood, nor did it contain any foreign matter that attracted any attention. During these two years she lost considerably in weight and became very pale and thin. She was not as strong as before, although she continued her work as a saleswoman.

In the autumn of 1895 she first noticed a tumor in the right side about two inches in diameter, not tender to pressure, and of firm consistency, located just beneath the tender area above referred to. The tumor seemed to make traction on this tender area, and she says it "felt as hard as a stone." It was at first spherical, barely noticeable when erect, and apparent only when the patient assumed a recumbent posture. She could not feel or see it at first when sitting or standing. The tumor was not noticeable at all times, but in about ten or fifteen minutes, after she made some movement which would bring on an attack of pain she would notice the swelling, which would gradually enlarge.

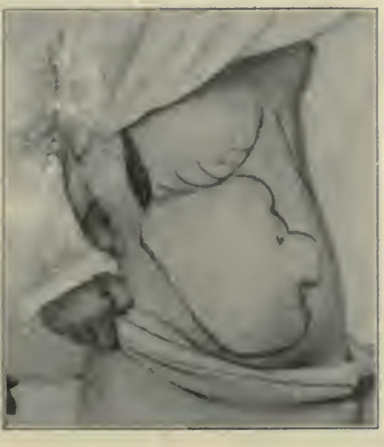
From this time on, and during 1896, the tumor increased in size in all directions, but principally downward. By the end of the latter year the tumor extended from one inch below the costal arch in the mammary line about three inches downward. As the tumor increased in size the attacks became progressively less painful up to September, 1897. At that time the tumor extended from the costal arch to one or two inches above the crest of the ileum. She could now place her hand beneath the tumor and lift it up; she could also outline it all around except posteriorly.

In 1897 she noticed that the tumor was constantly present, but varied greatly in size. She also observed that as time went on it required a longer time for the tumor to empty itself, and that it was more resistant. At such times it showed no tendency to decrease when she lay down, and it was necessary to use massage and pressure to bring this about. It usually required about three hours to accomplish this, and even then the contents of the tumor were not completely evacuated.

Throughout 1897, and until the present time, pressure upon the tumor causes her to have a desire to pass water, and she apparently evacuates the bladder; and, if pressure is continued, she has another evacuation in from fifteen to forty-five minutes, this being repeated until the tumor becomes collapsed.

At this time the tumor extends from the costal arch to the brim of the pelvis and Poupart's ligament, and from the median line in front to the scapular line posteriorly. (Fig. 1.) These boundaries are constant. The tumor varies in consistency, is fluctuating, and feels soft.

FIG. 1.



Its contour is regular, and it is not tender to pressure. For two months preceding the examination it has not been painful except in the original area of tenderness, where there is an almost constant feeling of soreness.

The tumor causes her no discomfort excepting when it is much distended; at such times she notices abdominal distention and a feeling of weight in the middle of the tumor. So far as she knows, she has never passed blood or other foreign matter in the urine; but is said to have had intermittent slight albuminuria.

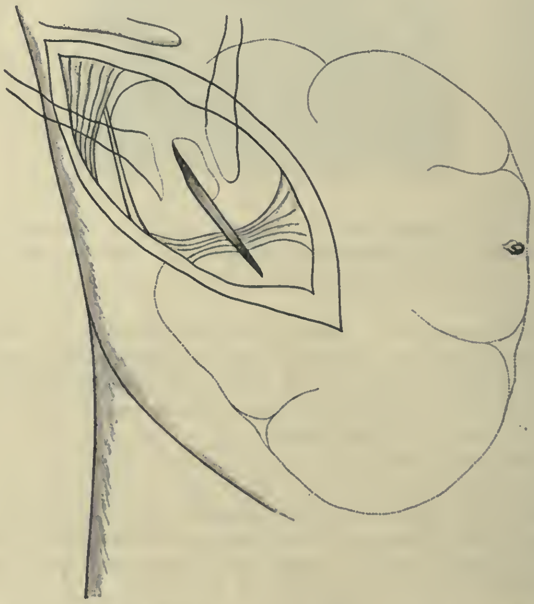
She feels well at present.

Operation: February 22, 1898, in the presence of the doctors from the Polyclinic, and assisted by Drs. Hessert, Buford, Waters, Doepfner, and Gillett, under ether narcosis I made cystoscopy with Kelly's instrument, the patient being in the knee-chest position. The bladder was normal; the left ureter could not be found; the right ureter was normal, and an elastic catheter was easily inserted 35 or 36 centimetres. No urine escaped, and the catheter could not be passed higher. I thought that this probably meant a bend in the ureter close to and below the pelvis of the kidney, or, rather, the cystonephrotic sac. As I could see no urine dribbling down when the elastic catheter was in the ureter, into which it had passed easily, I was afraid that I might have made a mistake, and therefore reintroduced Kelly's tube that I might see the catheter in the ureter. I then saw that the catheter was in the ureter, but that there was some bleeding at the ureteral orifice.

The patient was now turned on the left side with a pillow under the left hip. An oblique incision, 10 to 12 centimetres long, was made parallel to the twelfth rib from the erector spinæ. The latissimus dorsi was pulled aside or divided, and the quadratus lumborum divided. There was little perirenal fat. Respiratory movements could be observed through the transversalis fascia. The adipose capsule was a loose connective-tissue mass, containing little or no fat. It was so movable against the kidney that I took it to be the peritoneal cavity.

The surface of the kidney was globular and sacculated. It presented an elastic sac with a smooth, reddish or bluish-gray surface, resembling the color of kidney substance. In the wound a globular surface presented 5 or 6 centimetres in diameter. This was the top of the kidney located below the twelfth rib. It was consequently a floating kidney displaced downward. Below this surface was an annular depression corresponding to a partition wall of inter-pyramidal substance, and then a larger globular prominence below. Other less marked globular prominences corresponding to calyces were felt in the abdomen toward the median line. The sacs averaged 6 to 8 centimetres in diameter.

FIG. 2.



After packing sterile gauze around the borders of the sac the upper globular portion of the sac was fixed with two loops of heavy silk. (Fig. 2.) A perfectly limpid, clear, thin, transparent, light yellow fluid spurted from the stitch-holes. Dr. Brougham made cultures from this fluid.

I now incised the sac for a distance of 2 centimetres between the sutures. Hemorrhage followed the incision, which was so profuse that the yellowish, clear fluid became bloody. About a quart of the fluid was caught in a basin. The fluid was too transparent to contain any cells—that is, it was an aseptic cystonephrosis.

I now searched for the ureter inside of the sac. As the sac extended downward so as to fill the whole of the large pelvis the ureter was not sought for outside of the sac. In another case I might, however, do this after having found the ureter inside and passed a catheter down.

The incision was now prolonged downward for a distance of 6 or 8 centimetres. The wall of the sac was 3 millimetres thick. There was profuse hemorrhage from small vessels all over the wall, and from spurting arteries, especially at the location of the partition walls. I concluded that this vascularity was due to the presence of a good deal of secreting kidney substance. A small piece of this tissue was cut out for microscopical examination. The hemorrhage was stopped by Paquelin cautery, but the spurting arteries in the partition walls began to bleed again after the territory had been manipulated later on in the operation. This required the reapplication of the cautery three or four times in the course of the operation.

The inside of the cystonephrotic sac was sacculated ; a narrow opening 1½ centimetres in diameter led into a sac 4 to 7 centimetres in diameter; the inner surface was smooth, shining, reddish-white, and looked like a smooth mucous or serous surface. After an hour multiple small ecchymoses changed the surface to a spotted red, not a dark blood-red, exactly as I have seen in a normal bladder after opening and manipulation.

The nearest presenting opening into a calyx was now pulled out of the incision in the sac by hooking a finger into the calyx, and the partition wall was divided on a flat director with a Paquelin cautery. The division was bloodless, close to the thin borders of the opening into the sac, but the outer part of the partition walls, where they were 2 or 3 millimetres thick, bled considerably, so that the divided arteries required repeated applications of the cautery.

I divided four partition walls to the extent of 2 or 3 centimetres, thus laying open four sacs. Three or four sacs had wide openings, and were not divided. During this consecutive division of the partition walls the entire cystonephrotic sac was drawn out and turned inside out. This and the manipulation during the division of the partition walls were accomplished by hooking the index-finger into a sac through an opening or around the free border of a septum, and at the same time pushing in the wall of the sac from the outer surface of the cystonephrotic sac.

In this manner I gradually exposed for inspection the whole inner surface, and finally laid open to view a cavity, the pelvis or the pelvic portion of the sac, on which I found the entrance to the ureter as a semilunar transverse fold 5 to 7 millimetres in diameter (Fig. 3), below which I could see a row of larger folds, transverse and located 1 centimetre apart. A probe could be passed easily down 2 centimetres into the ureter.

Examination of the ureter. A long metal sound was passed down 24 centimetres, as I supposed into the bladder, but in order to make sure I passed a steel sound into the bladder through the urethra. I could not feel the click, however, the sounds did not meet, nor could they be felt by Dr. Bacon's finger in the vagina. The sound in the bladder appeared to be separated from the probe in the ureter by a soft wall. As I thought the probe might be too short, I passed a long, flexible catheter down through the ureter, expecting to see it in the bladder through the Kelly speculum. I could feel the end of the flexible catheter from the vagina. I could feel it move, but the movement was not free, as it would have been had it been in the bladder. It felt rather as if it was in the wall of the bladder, but was arrested in the portion of the ureter which passes through the wall of the bladder. I could feel no stone at the end of the catheter, and with the speculum I could not see the catheter in the bladder. The flexible catheter was now withdrawn; the attempt at withdrawal met with resistance, as if the catheter were caught low down in the ureter near or in the bladder wall.

FIG. 3.

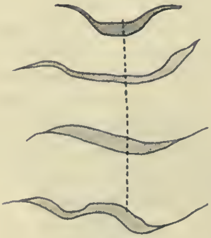
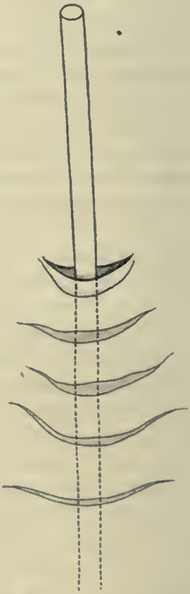


FIG. 4.



I now operated for the relief of the valve formation from the lateral implantation of the ureter in the pelvis. The pelvis was made tense by a finger of the left hand in the nearest calyx, and a flexible bougie passed down and into the ureter (see Fig. 4), which was then divided, together with the covering sac-wall, with scissors for a distance of 2 centimetres. The wall of the pelvis was grayish, 1 to 1½ millimetres thick, with loose connective tissue connected with the ureter, and consequently movable over it. The wall of the ureter was much thinner, probably ½ to ⅔ of a millimetre thick. The wall of the divided ureter was united with the divided wall of the pelvis by a continuous catgut suture (Figs. 5 and 6).

A long, flexible catheter was passed down 24 centimetres or more, when it met with a soft resistance, and when withdrawn was held at this point by something which it pulled upon when the attempt at withdrawal was made. This resistance was overcome with a sudden jerk low down in the ureter, above which place the catheter moved easily. Dr. Buford noticed that the withdrawal of the catheter was followed by a welling up of blood from the ureter, but I am not sure that this blood had not run down from the bleeding surfaces in the cystonephrotic sac.

A bougie was now passed down 20 centimetres and left permanently in the ureter.

The everted cystonephrotic sac was inverted and replaced, after final stoppage of the hemorrhage from the partition walls with the Paquelin cautery.

The opening in the cystonephrotic sac was sutured to the skin by eight silk sutures.

After uniting the quadratus lumborum with a buried mattress-suture, a part of the posterior and anterior borders of the wound was united.

FIG. 5.

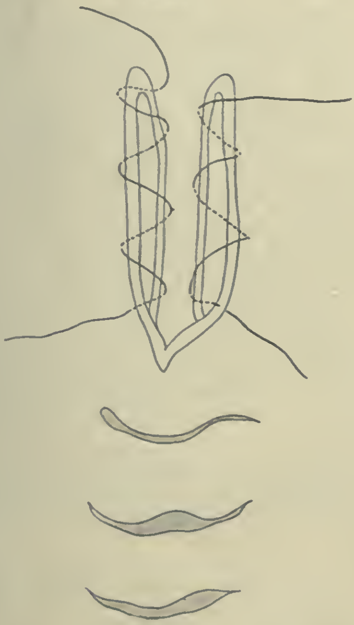
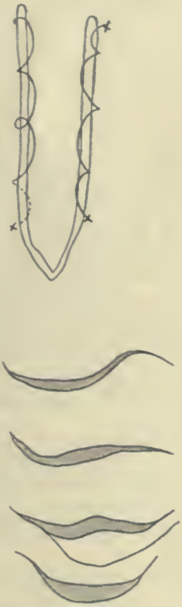


FIG. 6.



A large rubber drain was passed inside of the cystonephrotic sac down to the bottom, and the sac was loosely packed with sterile gauze around the drain. Gauze drains were packed around the outside of the sac between the latter and the abdominal wall.

The operation lasted two hours and a half; the loss of blood was slight. Toward the end of the operation the pulse became weaker, but not too frequent, 100 or below. Hypodermatic injections of camphorated oil and strychnine were made.

Examination of the fluid from the tumor. The tumor contained about 1200 cubic centimetres of fluid, which was limpid and transparent, distinctly acid, and had a specific gravity of 1013. It contained 36 grammes of solids, about one-half the normal amount; 4.8 grammes of urea, about one-fifth the normal amount; 7.8 grammes of chloride, one-half the normal amount. Phosphates, sugar, bile, and indican were absent, and sulphates present.

After-treatment. The first twenty-four hours after the operation the quantity of urine was much less than normal. This was followed by a rapid increase, which on the third day exceeded the normal amount, and on the sixth day amounted to 149 ounces. During this rapidly increasing secretion of urine the patient was extremely nervous and slept very little, although for the first few days, when the urine was fairly normal, the nervousness was not so marked. During this period of polyuria the patient drank large quantities of water both day and night, the quantity corresponding fairly well with the amount excreted. The patient constantly complained of thirst, and especially of dryness in the throat; no especial symptoms referable to the kidney were observed, and the only inconvenience was the frequent desire to empty the bladder.

On the tenth day a solution of pyoktanin was injected into the kidney, the openings carefully closed, and the patient instructed to lie on the opposite side for one or two hours. The solution did not appear in the urine, however. A week later, before the daily irrigation, the patient passed seven and one-half ounces of urine of normal color. Immediately after the irrigation, twelve ounces of perfectly clear fluid was withdrawn from the bladder. Pyoktanin was again used two and four days after the first employment, but still with negative results. The increased quantity of urine passed was not in any way dependent upon the filling up of the bladder by the boric-acid solution used for irrigating the wound, as there was no appreciable difference noticed in the quantity of urine passed within the same period before and after the irrigation. The ureter was demonstrated to be open only once, on the seventeenth day, when the quantity of urine passed was about normal. As the restlessness and nervousness of the patient subsided the quantity of urine decreased, and the thirst and dryness of the throat gradually diminished.

The right kidney secreted from three to eleven ounces in the twenty-four hours, which was estimated by weighing the dressings when applied and when removed, the difference in weight of the dressings representing the amount of uirne excreted.

The outcome of this case is not material, as the object of this report is only to show the feasibility of this method of operating.

PULMONARY TUBERCULOSIS WITH INTERCURRENT TYPHOID FEVER COMPLICATED BY PNEUMONIA—TRIPLE INFECTION.

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The following case, though but an isolated one, would seem to be worthy of record by reason of the rarity of the combination of conditions it illustrates. Simultaneous triple infection is not common, although I have recently reported a case in which typhoid fever, pulmonary tuberculosis, and syphilis coexisted,[1] at the same time making brief reference to the case now detailed at length:

An unmarried colored woman, aged twenty-eight years, who had been employed as a domestic, was admitted to the Philadelphia Hospital on August 13, 1898, with a temperature of 102° F., a pulse of 102, and respirations of 28, complaining of dizziness, deafness, swelling of the throat, and soreness of the chest. The abdomen was distended, the tongue was coated, and the breath was offensive. The woman had felt ill for three days, with malaise, anorexia, feverishness, and looseness of the bowels. There had been no epistaxis and no abdominal tenderness. The patient appeared well nourished. The tongue was dry and coated; the pulse rapid and irregular, but of good volume and tension. There was some mental dulness, but no physical abnormity was detected. There was nothing noteworthy in the previous history, but a sister of the patient had died of pulmonary tuberculosis, a brother of coxalgia, and another of spinal meningitis.

For the reduction of the temperature, which had risen to 104° F., the patient was sponged with ice-water and alcohol for twenty minutes on the 13th, an ice-bag being kept applied to the head constantly; but this having no appreciable effect, cold packs were employed on the 14th, at intervals of three hours, to the number of ten in the course of twenty-seven hours. These also were without marked effect. On the 15th a positive report was received as to the Widal test, and after three plunge-baths at this time the temperature fell below 102° F., and rose above this level only on the following day, to drop again in the sequence of a further bath, after which it gradually declined, reaching normal on the 21st, after nine days in the hospital.

During the illness there had been slight cough, some muttering delirium, and some tremulousness of speech, although the patient had slept fairly well. The highest temperature recorded was 104.6° F., the highest pulse 120, and the highest respirations 36. The patient appeared to enter upon convalescence, although the temperature ran a little above the normal, though never higher than 100° F., until September 7th, when it rose to 101° F. There was now complaint of headache, and there had been on several occasions nausea after taking food. By the 11th the temperature had risen to 102.4° F. and the respirations to 40, while the pulse did not exceed 116. The patient now complained of severe pain in the right side of the chest, referred to the region of the nipple and the angle of the scapula and synchronous with inspiration. Respiration was labored, the nasal alæ dilating on inspiration, and there was some delirium. On physical examination the pulmonary expansion was found deficient on the right side of the chest, with impairment of the percussion-resonance, subcrepitant râles on auscultation, and relatively increased vocal resonance and tactile fremitus. The withdrawal of five ounces of blood from the right side of the chest by means of wet cups afforded immediate relief from pain, and the patient was made quite comfortable in this respect. On the 14th the impairment of percussion-resonance had given place to dulness, the roughness of breathing had increased, and the subcrepitant were replaced by crepitant râles. The cough was short and painful and productive of but scanty expectoration. The respirations were rapid, reaching 40, and the pulse weak and thready, reaching 124. The temperature rose to 102.2° F. The urine contained a small amount of albumin and hyaline and granular tube-casts. On the 20th the temperature appeared to be falling by lysis. On the 22d the patient was expectorating small amounts of tenacious, blood-streaked sputum, in which pneumococci were found, but no tubercle bacilli. On the 24th the temperature reached normal, and so continued. The physical signs of pulmonary consolidation indicated only tardy clearing up, and the patient continued to be much troubled with nausea and vomiting; nor did she seem able to acquire strength. On the 27th the patient, quite unexpectedly, was noticed to grasp for breath. The pulse shortly became imperceptible, and death had taken place within thirty minutes.

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[1] Philadelphia Medical Journal, March 25, 1899, p. 679.

Upon post-mortem examination the left pleura was found adherent at the apex of the cavity, while on the right side firm adhesions were present anteriorly, posteriorly, and at the base. The pericardium contained about 5 c.cm. of blood-tinged fluid, and a few milk-spots were present on the posterior aspect of the visceral layer. The heart was covered with a thin layer of subpericardial fat. The myocardium was on section flabby and friable, pale brown in color, and granular in appearance. Here and there were areas, light yellow in color, probably of a fatty nature. The right side of the heart was greatly dilated and the muscular wall was quite thin. The tricuspid orifice easily admitted three fingers. The remaining valves and orifices presented no abnormality. The left lung was crepitant and emphysematous at its margins. Upon section serum exuded and a number of tubercles came into view at the apex, some caseous and some purulent. The right lung was quite firm throughout, especially at the base. Upon section the knife encountered distinct resistance, and the organ was found consolidated from apex to the base. At the apex the lung had a nodular feeling, while at the base it was uniformly solid. The cut surface was brownish in color, and in places pus exuded. Bits removed sank in water. The spleen presented a smooth surface; its pulp was soft and friable. The kidneys were pale, reddish-yellow on section, with the cortex increased greatly and of a fatty appearance; the structure of the organs was soft and friable. The surface of the liver was smooth, its edges rounded, its substance friable, its divided surface light red in color, and of granular appearance. The small intestine contained the remains of old ulcers, apparently healed.

This case presents several considerations of interest. In the first place it is characterized by the concurrence of three distinct infectious processes—tuberculosis, typhoid fever, and croupous pneumonia. There is no obvious and inherent reason why such an association should not take place, but as a matter of fact it is not common. In this case I should consider it coincidental and accidental, and not indicative of any more intimate inter-relationship. It is true that certain diseases seem to predispose to the development of certain other diseases, but any such relation would hardly be contended for in the present instance. We are, on the other hand, without adequate evidence that the existence of one infectious disease is antagonistic to the development of any other infectious disease. I should think that the tuberculosis was an ancient process, and probably the earliest of the three, because of its limitation to the apex and the caseous changes that had already begun to take place in it. No dependence, in this connection, can be placed upon the temperature, which declined almost to the normal when the attack of typhoid fever had come to an end, and actually to the normal while the pneumonia was yet unresolved.

It has in the past been thought by some observers that an antagonism existed between typhoid fever and tuberculosis. Thus Murchison[1] quotes M'Forget as making the statement that persons suffering from pulmonary tuberculosis are rarely attacked by typhoid fever and as regarding the former as a preservative against the latter, although Murchison adds: "Whether this be so or not, an attack of enteric fever is often followed by tuberculous deposits in the lungs."

Osler[2] states that "typhoid fever occasionally occurs in persons the subject of pulmonary tuberculosis. In four cases of eighty autopsies in typhoid fever tuberculous lesions were present. There are cases on record also of acute miliary tuberculosis and typhoid fever present in the same subject. There is a wide-spread opinion that typhoid fever predisposes to tuberculosis, and Wilson Fox, in his treatise on *Diseases of the Lungs*, gives reference to a number of cases. In my experience it has been very rare. I have no recollection of an instance in which tuberculosis has developed either during convalescence or immediately after recovery from typhoid fever." Tuberculosis is not mentioned at all as a complication among 389 cases of typhoid fever reported by Osler.[3]

Although the association of the two diseases is perhaps not actually common, there is abundant evidence to remove all doubt as to its occurrence, and of the fact that typhoid fever may develop in a tuberculous subject, and tuberculosis in the course or sequence of an attack of typhoid fever, and either bowel or lung or both be involved in the tuberculous process. Among 2000 fatal cases of typhoid fever examined after death at Munich, Hölscher[4] noted 108 (5.4 per cent.) of tuberculosis in various situations, and he quotes Gruber[5] as having noted among 710 fatal cases of typhoid fever twenty-two (3.3 per cent.) complicated by old tuberculosis of the lungs. Bettke,[6] among 1420 cases of typhoid fever at Basle, noted twenty-three (1.6 per cent.) in tuberculous subjects; while Döpfer[7] noted tuberculosis in forty-six (5 per cent.) among 927 cases of typhoid fever.

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[1] The Continued Fevers of Great Britain, third edition. London, 1884.

[2] Principles and Practice of Medicine, 1898, third edition, p. 315.

[3] Johns Hopkins Hospital Reports, vols. iv. and v.

[4] Münchener med. Wochenschrift, January 20 and 27, 1891.

[5] Dissertation: Ueber Complication von Typhus und Tuberculose, 1887.

[6] Deutsche Klinik, October 15 and November 26, 1870.

[7] Münchener med. Wochenschrift, September 11, 1888.

The pneumonia in the present instance was evidently a late complication. It was lobar in type, and, as microscopical examination of the sputum stained during life showed, of pneumococcous origin. Croupous pneumonia complicating typhoid fever occurs, as a rule, at the height of the attack or toward the close of the febrile period, rarely at the onset, and seldom during convalescence or in the course of a relapse. Lobar pneumonia is less common than lobular pneumonia. Thus among the 2000 fatal cases at Munich, Hölscher[1] noted 164 cases of lobular pneumonia (8.2 per cent.); 138 of croupous pneumonia (6.9 per cent.): and twelve of desquamative pneumonia (0.6 per cent.). Bettke,[2] among the 1420 cases at Basle, noted fifty-two of lobar pneumonia (3.6 per cent.), and lobular pneumonia in only fifteen cases (1 per cent.), although he adds the qualification that he did not venture the diagnosis of lobular pneumonia in cases in which recovery ensued, and he admits that he may thus have included some of these cases among the number of those of lobar pneumonia. Finally, Döpfer[3] noted among his 927 cases sixty-three of lobular pneumonia (6.8 per cent.); thirteen of hypostatic pneumonia (1.3 per cent.); two of desquamative pneumonia (0.2 per cent.); and fifty-five of croupous pneumonia (6 per cent.).

Among 229 cases of typhoid fever observed by Osler at the Johns Hopkins Hospital,[4] seven were complicated by pneumonia, and two of these terminated fatally. Among 160 additional cases,[5] pneumonia as a complication is not mentioned.

A. Fräukel[6] relates that among 500 cases of typhoid fever seen in the course of nine years he has observed six complicated by true fibrinous pneumona.

The lobular pneumonia complicating typhoid fever is due principally to the activity of pyogenic cocci, and especially streptococci and staphylococci, though it is believed that typhoid bacilli also may play a causative rôle. Croupous pneumonia complicating typhoid fever is dependent almost exclusively upon the activity of the pneumococcus of Fränkel-Weichselbaum, rarely upon that of the bacillus of Friedländer. In some cases the typhoid bacillus is responsible for the pneumonia, and then the complication is most likely to occur early. This form of pneumonia is said to be frequently unattended with a chill, to be marked by less rapid elevation of temperature, less pronounced infiltration, tardy recession, and an absence of the characteristic sputa.[7] It is only to cases of typhoid fever in which the complicating pneumonia is dependent upon the typhoid bacillus that the designation pneumo-typhoid or typhoid pneumonia can with propriety be applied.

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[1] Op. cit.
[2] Op. cit.
[3] Op. cit.
[4] Johns Hopkins Hospital Reports, vol. iv., 1895.
[5] Loc. cit., vol. v., 1895.
[6] Berliner klinische Wochenschrift, March 20, 1899, p. 266.
[7] Curschmann. Nothnagel's Specielle Pathologie u. Therapie, 3. Band, I. Theil,

A CASE OF MITRAL STENOSIS, WITH FEVER (NON-MALARIAL) OF RELAPSING TYPE.

By Frederick P. Henry,
OF PHILADELPHIA, PA.

The title of this report is open to criticism, inasmuch as the fastigium of relapsing fever continues for a period of several days, whereas in the case I am about to discuss the acme of the fever was maintained for but a few hours. In employing the adjective relapsing I mean to imply a fever *recurring* at intervals of about one week, and, so far as I am aware, such a type of fever, in connection with endocarditis, has not been hitherto described. In a paper entitled "The Chronic Intermittent Fever of Endocarditis,"[1] Osler reviews the literature of the subject, mostly English, and finds one of the earliest references to it in Ormerod's Gulstonian Lectures, which were published in 1851. In this case there were two febrile paroxysms daily, and in all the reports with which I am acquainted the type of fever has been either quotidian, tertian, or, as in Ormerod's case, double quotidian. The rarity of the febrile type presented by my case has seemed to me sufficient warrant for its publication.

Margaret D., aged nineteen years, dressmaker, admitted January 21, 1899. Father living and well at the age of sixty-eight years; mother died at the age of thirty-two years of pneumonia. Has had four brothers and three sisters, of whom one brother and two sisters are living. The patient had typhoid fever three years ago; rheumatism in childhood; pneumonia a few months ago. She has lived in Philadelphia all her life.

Present Illness. About ten days before admission she began to feel weak and languid and disinclined to work, with headaches, pains in the back of the neck and back, and poor appetite. In addition there was anorexia, occasional nausea and vomiting, soreness in the abdomen, epistaxis, diminished excretion of urine, and cough. The menses have been suspended for two months. The patient is a fairly well nourished white female of average height. Her face is flushed, expression dull, eyes half closed, tongue lightly coated and tremulous; pulse 96, respirations 30, temperature on admission 99.2° F.

Physical examination revealed nothing abnormal except a typical presystolic murmur, low pitched, prolonged and rumbling, followed by short, sharp, first sound, the second sound being scarcely audible at the apex. The heart is but little if at all enlarged, the apex-beat being palpable in the fifth intercostal space within the mammary line.

On the day after admission the temperature became normal, and so continued until the 26th, five days later, when it began to rise. On the 28th, at 8 A.M., it reached 101.4° F.; on the 29th it was again normal, and remained so until February 4th (six days later), when it

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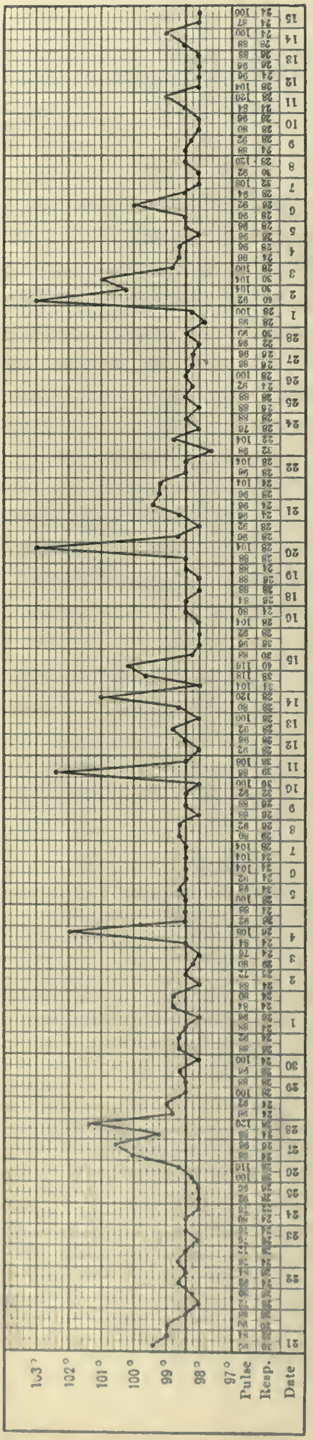
[1] Practitioner, 1893, vol. l. p. 181.



suddenly rose at 8 A.M. to 102° F. Six days later, at 6 P.M., there was another ascent to 102.4° F. On the 20th it again rose at 8 A.M. to 103° F., slighter elevations having occurred on the 14th and 15th. On March 1st (at 8 A.M.) it again suddenly rose to 103° F., after which it continued normal.

The accompanying chart shows the character of the febrile movement much better than any verbal description. On two occasions the rise of temperature was accompanied with a chill, and in one with the vomiting of undigested food. Repeated examinations of the blood for the malarial organism gave negative results. The urine was free from albumin, sugar, and casts, and the liver was of normal size and apparently healthy in all respects. It is scarcely necessary to add that foci of suppuration were carefully excluded.

On March 25th the patient was examined in the clinic by my hospital colleague, Dr. Edward P. Davis, with special reference to the question of pregnancy. Dr. Davis concluded that the woman was pregnant.

The blood was examined on three occasions, the average of the three counts giving 2,705,000 red corpuscles per c.mm. and 20 per cent. of hæmoglobin. The leucocytes numbered 6000 per c.mm. A differential count of the latter was not made.

To recapitulate: The patient is a young, unmarried woman, pregnant, highly chlorotic, with well-marked though well-compensated mitral stenosis and fever, which may be styled recurrent, relapsing, or intermittent, but is certainly not malarial. The inference that the fever is dependent upon the heart lesion is based on the fact that no other cause for it could be found. This is the basis upon which rests the universally accepted opinion that the more regular types of intermittent fever and the continued fever associated with endocarditis are dependent upon the latter.

So far as I am aware, no theory has been advanced to explain the intermittency of non-malarial fever, such as that attending hepatic disorders, tuberculosis, endocarditis, etc. In discusing these intermittent fevers it should, I think, be borne in mind that in health there is a diurnal variation of the temperature, and that, as I demonstrated in the Cartwright Essay for 1881, diurnal elevation is coincident with a diminution in the number of the red blood-corpuscles and an increased elimination of urinary pigment—in short, that it corresponds with hæmolysis. As first pointed out by William Hunter, the occasional elevations of temperature in pernicious anæmia are also hæmolytic, as evidenced by their coincidence with a deeper discoloration of the skin, an excessive elimination of pathological urobilin, and a still further diminution in the number of red corpuscles. The condition, in short, is an exaggeration, or, rather, a perversion of what obtains in health. The intermittency of the malarial fevers is also conincident with a parasitic invasion and destruction of the red corpuscles; and with these facts to guide us I would suggest the probability of solving the problem of non-malarial intermittency by a careful study of the blood.

It might be suggested that the fever of my patient was due to the impoverished state of the blood; in other words, that it was the same in kind as the so-called anæmic fever of pernicious anæmia. In reply to such a supposition I would call attention to the fact that the characters of the blood were those of chlorosis, the percentage of red cells being more than double that of the hæmoglobin, and that febrile chlorosis is rarely met with. According to Huchard also, fever, when it occurs in chlorosis, is continuous.[1] It might, with equal propriety, be argued that the anæmia is the result of the valvular affection, for, as is well known, in endocarditis, especially of the ulcerative form, the anæmia is often intense. I recall a case of ulcerative endocarditis which I saw with the late Dr. James H. Hutchinson in which the anæmia was so profound and the cardiac murmur (mitral systolic) so soft that the diagnosis for a time vacillated between pernicious anæmia and ulcerative endocarditis. At the autopsy the left auriculo-ventricular orifice was almost occluded with vegetations, and most of the viscera contained numerous emboli.

The fact that my patient is still living and at present free from fever is no argument in favor of the view that this symptom was not etiologically connected with the valvular disease, but was due to some undiscovered ephemeral cause. I have purposely refrained from using the term "malignant" as applied to endocarditis, because I know of no dividing line, either clinical or bacteriological, that can be drawn between malignant and benign forms of that disease. The view that an ulcerative endocarditis is necessarily fatal is also disputed by

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[1] Sajous' Annual Univ. Med. Sciences, 1891, vol. ii.

Leyden,[1] who relates two cases of apparent recovery from that condition.

The sole criterion of malignancy in cases of endocarditis is their fatal termination after an acute febrile attack, which may be intermittent, continuous, or, as in the case just reported, recurrent or relapsing.

COMPARATIVE ACTION OF THE GREEN AND BROWN STROPHANTHUS SEEDS.

By Henry H. Rusby, M.D.,
PROFESSOR OF MATERIA MEDICA AT THE NEW YORK UNIVERSITY AND BELLEVUE HOSPITAL MEDICAL COLLEGE AND AT THE NEW YORK COLLEGE OF PHARMACY.

The Committee on Research of the American Medical Association in 1897 instituted a comparative investigation of the green and brown strophanthus seeds, work in the different departments being undertaken by different investigators. Dr. Franz Pfaff, of the Harvard Physiological Laboratory, undertook an investigation of their physiological action, which was carried out by his assistant, Dr. M. P. O. Vejux-Tyrode. The complete reports of these experiments are but now ready for publication, and are presented herewith.

Perfect specimens of the two seeds were carefully selected by myself and 5 per cent. tinctures of them prepared. These tinctures were marked "A" and "B," respectively, and were thus supplied to Dr. Pfaff without any further knowledge on his part of their identity. In the report entitled "First Report" these are referred to only as "A" and "B." Through an accident in transportation, the key to the application of these letters was lost, so that it was not certainly known which referred to the green and which to the brown seeds. Fresh lots of seeds were therefore selected, tinctures made as before, and the experiments repeated as detailed in the report entitled "Second Report." Dr. Tyrode recognized the tincture of the green seeds as corresponding to "A" in the first report, that of the brown to "B."

It will be seen that the results of these experiments prove the existence in strophanthus seeds of two distinct principles, one of which may be referred to as the "toxic principle," the other as the "cardiant principle." That they are distinct principles is clear, as the two seeds exhibit the two properties in opposite rather than in parallel degrees.

These two properties have not been definitely located in the different constituents. When this shall have been done it may enable us to devise preparations which will represent the one and eliminate the other.

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[1] Ueber intermittirendes Fieber und Endocarditis. Zeitschrift für klin. Med., 1882, No. 4.

There can be little doubt remaining that the two plants yielding these seeds are specifically distinct—that is, the one is not a mere variety of the other.

Lastly, if the conclusion is correct that "A" represents the green and "B" the brown seeds, it follows that the green seeds, or those of S. Kombé Oliver, should alone be specified and described in the *Pharmacopœia.*

COMPARISON OF TWO SOLUTIONS OF STROPHANTHUS.[1]

First Report. By Dr. Maurice P. O. Vejux-Tyrode.

Dr. H. H. Rusby, on behalf of the Committee on Research of the American Medical Association for 1897, has submitted for comparative examination two alcoholic solutions of different seeds of strophanthus, namely, the green and the brown, which were prepared in the same manner.

These two solutions (marked "A" and "B") are of a pale straw-color, the color of solution "A" being slightly deeper than that of solution "B." Both become opalescent when mixed with water.

As strophanthus is a heart poison, my efforts toward making a comparison were directed to the circulation, which was studied mainly by means of blood-pressure experiments.

The following series of experiments was performed upon rabbits, which were prepared for this purpose by being deprived of food for twenty-four hours. Before the experiments they were narcotized with seven decigrams of chloral per kilogram of body-weight. By means of a canula the carotid was connected with a mercury manometer, which recorded the blood-pressure upon the kymograph. The drug was introduced into the circulation by injection into the jugular vein. Curves were taken about every five minutes. The measurement of the pressure in the table of experiments is given for every quarter of an hour.

I performed fifteen experiments on blood-pressure; eight of these were done with solution "A," while the seven others were done with solution "B." Since the results of all these experiments do not materially differ, I shall cite but four instances. The first two were performed with solution "A," diluted ten times; the last two with solution "B," diluted in Experiment 3 ten times, and in the other experiment twenty times. It was found necessary to make this dilution so that the drug might not reach the heart in too concentrated a form, and also to avoid the irritating effect of the alcohol.

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[1] The writer wishes to express his sincere thanks to Dr. Franz Pfaff, Instructor in Pharmacology at the Harvard Medical School, under whose direction this work was done, for many valuable suggestions and for kind and careful criticism.

Experiment I. With solution "A," diluted ten times. December 1, 1897. Rabbit weighed 198 grammes. At 10 A.M. received one grain of chloral in 50 c.c. aqua per os. Operation began at 12.10; operation finished at 12.45. Canulas in carotid artery and in jugular vein.

Time. P.M.	*Blood pressure in mm. of Hg.*	*Remarks.*
12.15—1.15	48	
1.15—1.30	50—64	1.20. Injected ½ c.c. dilute strophanthus.
1.30—1.45	70—76	1.45. Injected ⅓ c c. dilute strophanthus.
1.45—2.00	80—86	1.55. Injected ⅓ c.c. dilute strophanthus.
2.00—2.15	88	2.12. Injected ⅓ c.c. dilute strophanthus.
2.15—2.30	88—92	2.25. Injected ⅛ c.c. dilute strophanthus.
2.30—2.45	92	2.40. Injected ⅓ c.c. dilute strophanthus.
2.45—3.00	92	3.00. Pulse quite irregular.
3.00—3.15	88	3.05. Injected ⅓ c.c. dilute strophanthus. 3.6—3.20. Clot removed from carotid.
3.15—3.30	110	3.25—3.30. Another clot removed. Pulse curve continued irregular until death.
3.30—3.45		
3.45—4.7	104	4.7. Animal died.

Experiment II. With solution "A," diluted ten times. December 8, 1897. Rabbit weighed 2220 grammes. At 9.30 A.M. received 1.55 grammes of chloral in 50 c.c. aqua per os. Operation begun at 10; operation terminated at 10.30. Canulas in carotid artery and in jugular vein.

Time. A.M.	*Blood pressure in mm. of Hg.*	*Remarks.*
10.40—10.55	52—54	
10.55—11.10	52—54	11.5. Injected ⅓ c.c. dilute strophanthus.
11.10—11.25	54—60	11.16. Injected ⅓ c.c. dilute strophanthus. 11.24. Injected ⅓ c.c. dilute strophanthus.
11.25—11.40	62—66	
11.40—11.55	60	11 52. Injected ⅓ c.c. dilute strophanthus.
11.55—12.10	62—68	12.5. Injected ⅓ c.c. dilute strophanthus.
12.10—12.25	68—74	
12.25—12.40	....	Clot removed from carotid.
12.40—12.55		
12.55—1.10	56—60	1.2. Injected ⅓ c.c. dilute strophanthus.
1.10—1.25	60—78	1.13. Injected ⅔ c.c. dilute strophanthus.
1.25—1.40	82	
1.40—1.55	80—84	1.41. Injected ½ c.c. dilute strophanthus.
1.55—2.10	84—98	1.58. Injected ½ c.c. dilute strophanthus. 2.3—2.25. Pulse curve irregular.
2.10—2.25	98—100	2.15. Clot removed from carotid.
2.25—2.40	....	2.35. Prepared other carotid.
2.40—2.55	62—84	
2.55—3.10	82—94	
3.10—3.25	60—70	3.20. Injected ½ c.c. dilute strophanthus. 3.17—3.27. Quite regular beat, large pulse curve.
3.25—3.38	72	3.34. Injected ½ c.c. dilute strophanthus. 3.38. Animal died.

Experiment III. With solution "B," diluted ten times. January 3, 1898. Rabbit weighed 1890 grammes. At 12 M. received 1.32 grammes of chloral in 50 c.c. aqua per os. Operation begun at 12.50; operation finished at 1.20. Canulas in carotid artery and in jugular vein.

Time. P.M.	*Blood pressure in mm. of Hg.*	*Remarks.*
1.55—2.10	48—72	
2.10—2.15	70—72	2.12. Injected $\frac{1}{10}$ c.c. dilute strophanthus.
2.15—2.30	70	2.23. Injected $\frac{1}{3}$ c.c. dilute strophanthus.
2.30—2.45	....	Clot removed from carotid.
2.45—3.00	82—86	3.00. Injected $\frac{1}{10}$ c.c. dilute strophanthus. Pulse curve irregular.
3.00—3.15	66—76	
3.15—3.30	78—86	3.25—3.30. Clot removed from carotid.
3.30—3.45	72	3.45. Injected $\frac{1}{10}$ c.c. dilute strophanthus.
3.45—4.00	68	3.45—4.55. Pulse curve irregular.
4.00—4.15	58—62	
4.15—4.30	46	4 30. Injected $\frac{1}{3}$ c.c. dilute strophanthus. Pulse curve very irregular.
4.30—4.55	46	4 50. Injected $\frac{1}{10}$ c.c. dilute strophanthus. 4.55. Animal died.

EXPERIMENT IV. With solution "B," diluted twenty times. January 12, 1898. Rabbit weighed 1900 grammes. At 9.15 A.M. received 1.33 grains of chloral in 50 c.c. of aqua per os. Operation begun at 10; operation finished at 10.20. Canulas in carotid artery and in jugular vein.

Time. A.M.	*Blood pressure in mm. of Hg.*	*Remarks.*
10.25—10.40	76— 86	
10.40—11.00	76— 88	10.40. Injected $\frac{1}{3}$ c.c. dilute strophanthus. 10.55. Injected $\frac{1}{3}$ c.c. dilute strophanthus.
11.00—11.15	88— 98	11.8. Injected $\frac{1}{3}$ c.c. dilute strophanthus.
11.15—11.30	90—100	11.30. Injected $\frac{1}{5}$ c.c. dilute strophanthus.
11.30—11.45	86— 90	11.40. Injected $\frac{1}{5}$ c.c. dilute strophanthus.
11.45—12.00	58— 86	11.52. Injected $\frac{2}{5}$ c.c. dilute strophanthus. 11.55—1.00. Pulse curve quite irregular.
12.00—12.15	68— 84	
12.15—12.30	44— 70	12.25. Injected $\frac{1}{5}$ c.c. dilute strophanthus.
12.30—12.45	60— 68	12.42. Injected $\frac{1}{3}$ c.c. dilute strophanthus.
12.45— 1.00	66	1.00. Animal died.

RÉSUMÉ OF THE FOREGOING EXPERIMENTS

Number of experiments.	Average blood pressure in mm. of Hg before injection of stroph.	Average blood pressure in mm. of Hg from first injection of stroph. to the maximum rise.	Difference between the two in mm. of Hg.	Time between the two.	Amount of diluted drug injected.
Sol. A. I.	50.8	83.34	35.54	2 hrs. 15 min.	2.33 c.c.
" II.	51.6	67.8	16.2	3 " 10 "	4.00 "
Sol. B. III.	61.32	77.6	16.28	1 " 10 "	0.53 "
" IV.	77	87.2	10.2	0 " 35 "	1.00 "

While performing the blood-pressure experiments I noticed a marked difference in the degree of toxic properties between the two solutions. The quantity of drug which could be injected before the death of the animal seemed notably greater when solution "A" was used.

To determine the difference in toxicity between the two solutions, experiments were made upon frogs. The usual method of preparing the frogs for heart experiments was adopted. The drug was introduced into the dorsal lymph-sacs.

Below is a table showing the results of these experiments:

STROPHANTHUS A.

I. Frog weighed 45 grammes.

Time.	*Heart beat per min.*	*Remarks.*
5.12 P.M.	70	5.15. Injected 0.025 in 0.2 aq.
5.35	44	
5.50	18	
6.10	0	6.10. Heart stopped. Total injection 0.025

II. Frog weighed 35 grammes.

Time.	*Heart beat per min.*	*Remarks.*
11.40 A.M.	52	12.5. Injected 0.01 in 0.2 aq.
12.10	48	12.15. Injected 0.005 in 0.1 aq.
12.35	27	
12.50	0	12.50. Heart stopped. Total injection 0.015.

III. Frog weighed 65 grammes.

Time.	*Heart beat per min.*	*Remarks.*
2.20 P.M.	76	2.35. Injected 0.01 in 0.2 aq.
2.45	71	
3.15	59	3.32. Injected 0.005 in 0.1 aq.
3.45	48	
4.15	29	Heart very weak.
4.50	18	
5.12	0	Heart stopped. Total injection 0.015.

IV. Frog weighed 70 grammes.

Time.	*Heart beat per min.*	*Remarks.*
		12.45. Injected 0.01 in 0.2 aq.
1.00 P.M.	60	
1.30	53	1.45. Injected 0.005 in 0.1 aq.
2.00	52	
2.30	44	2.40. Injected 0.005 in 0.1 aq.
3.5	27	
3.15	0	Heart stopped. Total injection 0.02 c.c.

V. Frog weighed 60 grammes.

Time.	*Heart beat per min.*	*Remarks.*
4.20 P.M.	89	4.25. Injected 0.01 in 0.2. aq. After total injection 0.01 heart did not stop in two hours.
4.55	72	
5.25	58	
5.55	43	
6.28	48	Heart strong and regular. Experiment discontinued.

STROPHANTHUS B.

VI. Frog weighed 60 grammmes.

Time.	*Heart beat per min.*	*Remarks.*
8.15 A.M.	82	8.25. Injected 0.005 in 0.1 aq.
8.45	69	8.45. Injected 0.0025 in 0.05 in aq.
9.15	72	
9.45	53	
10.15	20	10.5. Ventricle almost non-contractile.
10.35	0	Heart stopped. Total injection 0.0075.

VII. Frog weighed 60 grammes.

Time.	*Heart beat per min.*	*Remarks.*
9.25 A.M.	82	9.28. Injected 0.005 in 0.1 aq.
9.45	78	
10.25	34	
10.50	44	11.15. Injected 0.0025 in 0.05 aq.
12.35	16	12.35. Injected 0.00125 in 0.025 aq.
12.55	0	Heart stopped. Total injection 0.00875.

Time.	*Heart beat per min.*	*Remarks.*
		VIII. Frog weighed 70 grammes.
3.00 P.M.	62	3.15. Injected 0.005 in 0.1 aq.
3.30	58	
4.00	52	
4.35	46	4.40. Injected 0.0025 in 0.05 aq. Marked peristalsis of heart.
5.00	42	
5.30	44	5.45. Injected 0.00125 in 0.025 aq.
6.00	40	6.35. Injected 0.00125 in 0.025 aq.
6.40	18	
7.5	0	Heart stopped. Total injection 0.01.
		IX. Frog weighed 60 grammes.
3.00 P.M.	74	3.15. Injected 0.005 in 0.1 aq.
3.30	64	
4.00	64	4.25. Injected 0.0025 in 0.5 aq.
4.30	64	
5.00	30	5.10. Injected 0.00125 in 0.025 aq.
5.30	32	5.45. Injected 0 00125 in 0.025 aq.
6.00	52	6.15. Injected 0.00125 in 0.025 aq.
6.30	34	
6.45	0	Heart stopped. Total injection 0.01125.
		X. Frog weighed 50 grammes.
9.25 A.M.	76	9.30. Injected 0.0075 in 0.15 aq.
10.00	60	
10.30	30	11.00. Marked peristalsis of heart.
11.00	58	11.8. Injected 0.00125 in 0.025 aq.
11.25	54	Heart irregular and intermittent.
12.00	48	
12.30	0	12.30. Heart stopped. Total injection 0.00875,
		XI. Frog weighed 55 grammes.
9.20 A.M.	60	9.30. Injected 0.0075 in 0.15 aq.
10.00	68	
10.35	50	
11.00	36	
11.35	8	
12.00	0	Heart stopped. Total injection 0.0075.

In the four typical experiments on blood-pressure (see Experiments I., II., III., IV.) one can see that the highest blood-pressure after the injections of solution " B" is about one-half as great as the maximum blood-pressure obtained with solution " A."

Naturally, with the same solution there is a certain range of variation in the height of the blood-pressure for different animals.

If we take an average of the height of the blood-pressure in the experiments with solution " A" and solution " B" we find that with solution " A" the average is about twice as great as that with solution " B."

As regards the difference in toxic power, the few experiments upon frogs show that with solution " A" the heart was stopped after a minimum toxic dose of 0.015 c.c. and a maximum dose of 0.025 c.c. The minimum toxic dose of solution " B" is 0.0075 c.c., while the maximum is 0.01125 c c.

I conclude from the experiments done that both solutions are active in raising the blood-pressure, and in toxic doses cause the frog's heart to stop; that solution "B" is twice as toxic as solution "A"; that solution "A," although it requires a little more of the drug, gives a longer, higher, and more constant rise of blood-pressure.

Second Report. No. 1 Experiment with Green Seeds. December 6, 1898.

Rabbit weighed 2090 grammes. Narcotized with 0.7 grammes of chloral hydrate per kilo weight. Canula in carotid and in jugular.

Time.	*Blood pressure in mm. of Hg.*	*Remarks.*
9.55—10.5	76—70	
10.5 —10.15	82—80	10.5. Injected ⅓ c.c. (tinct. stroph. diluted ten times).
10.15—10.30	76	10.25. Cleaned out carotid. 10.32. Injected ⅓ c.c.
10.30—10.55	76—86	10.40. Prepared other carotid.
10.55—11.5	76—86	10 55. Injected rest of 1st c.c. 11.7. Injected ⅓ 2d c.c.
11. 5—11.15	80	11.15. Injected ⅓ 2d c.c.
11.15—11.30	84—92	
11.30—11.45	78—86	11.35. Injected rest of 2d c.c.
11.45—12.00	82	11.55. Injected ½ 3d c.c.
12.00—12.15	82—84	12.15. Injected ¼ 3d c.c.
12.15—12.30	84—92	
12.30—12.45	92—112	12.30. Injected rest of 3d c.c.
12.45— 1.00	60—68	12.45. Injected ¼ 4th c.c.
1.00— 1.15	60—82	
1.15— 1.30	96—170	
1.35	102	1.35. Killed the animal.

No. 2 Experiment with Brown Seeds. December 8, 1898.

Rabbit weighed 2130 grammes. Narcotized with 0.7 grammes of chloral hydrate per kilo weight. Canula in carotid and in jugular.

Time.	*Blood pressure in mm. of Hg.*	*Remarks.*
12.5 —12.25	88—102	
12.25—12.55	104—110	12.27. Injected ⅓ c.c. (tinct. stroph. diluted ten times).
12.55— 1.15	118—128	12 35. Injected ⅓ 1st c.c.
1.15— 1.30	86—128	12.50. Injected ¼ 1st c.c. 1.20. Injected ⅓ 2d c.c.
1.30 – 1.45	86—114	
1.45— 2.00	84	1.55. Injected ⅓ 2d c.c.
2 00— 2.15	74—84	
2.30— 2.40	70	2.50. Animal died.

CRITICAL SUMMARY OF LITERATURE

ON

TUBERCULOSIS OF THE WALLS OF THE BLOODVESSELS AND THE PRODUCTION OF MILIARY TUBERCULOSIS.[1]

By Harvey R. Gaylord, M.D.,
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The younger men of this generation can have but an inadequate appreciation of the difficulties which were overcome by those pioneers to whose work we to-day owe our clear and satisfactory understanding of the mechanism involved in the production of miliary tuberculosis. The reason why the problem was one of such difficulty was owing to the fact that through the teachings of Rokitansky and Virchow the walls of the bloodvessels were supposed to be immune to tuberculous infection. Besides this difficulty it must be remembered that in those days, in which the very dawn of knowledge regarding tuberculosis had begun to break, the so-called caseous inflammation and caseous hyperplasia were not considered to have the most remote relation to tuberculosis. The first ray of light upon the subject came when Buehl and Dietrich propounded the doctrine that tuberculosis was produced by infection from without, and that this infection or poison, being carried into the bloodvessels, produced the miliary and subacute dissemination of the process. They further made the observation that in every case of general miliary tuberculosis somewhere in the body an older focus of caseous degeneration was to be found. Investigation following upon the Buehl-Dietrich doctrine did not confirm in full this observation, for in many cases it was impossible for the pathologist to locate the primary focus of the infection. Owing to the then current doctrine of Rokitansky, that the bloodvessels themselves were never the seat of infection, pathologists paid but slight attention to this field. True, Sir Astley Cooper had described in 1798 the existence of tuberculous infection of the ductus thoracicus. But this had been forgotten, and was only recalled, when nearly one hundred years afterward, Ponfic, at the Munich Natural Science convention of 1877, described his observations of cases of a similar nature. Ponfic saw no connection between the tuberculous infection of the thoracic duct and the accompanying miliary tuberculosis, believing, in fact, that the infection of the thoracic duct was secondary.

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[1] Part of an address delivered at the quarterly meeting of the Buffalo Academy of Medicine, March 21, 1899.

In the same year Weigert observed the first lesion of the vena anonyma produced by the caseation of a lymph-node and the extension of the process through the vessel wall. He describes most vividly his astonishment on making this observation, and tells how for the first time he believed that he had found the true source of the miliary infection. His hopes were, however, doomed to temporary disappointment, for in the months following his first observation he was unable to find a second similar lesion. It was only a year later when, as he says, he had become emancipated from the doctrine of Buehl and Dietrich, that in every case of miliary tuberculosis a much older focus of caseation must be present; that in August, 1878, he found on the 21st and again on the 22d of that month, in two cases of general miliary tuberculosis, primary vascular lesions[1] of the pulmonary veins. These lesions were plainly visible to the naked eye, and in his original publication have been the subject of the most minute description. When we realize that in those days the tubercle bacillus was unknown, it is remarkable with what acumen and philosophical reasoning he drew his deductions. From this time the number of cases in which he was able to locate the primary vascular lesion became so numerous that in 1882 he pronounced the following rules by which the primary lesion of the vessel in miliary tuberculosis could be determined. He said: "When a tubercular lesion of a vein or other bloodvessel is the source from which the mass of bacilli which have produced the miliary tuberculosis have sprung it must fulfil the following conditions:"

1. The primary lesion must by its appearance and structure (caseation, size, etc.) prove to be of greater age than the miliary nodules.
2. The tuberculous focus must, when not located in the heart substance, occupy a portion of the wall of a vein or larger lymph-channel which is patulous—that is, not obliterated.
3. The eruption of miliary tubercles must be of such a character as to be only explainable by the theory that a large amount of tuberculous poison has entered the blood at once, and that, in other words, their development has occurred in a relatively short space of time.
4. The tuberculous poison must actually extend to the surface of the focus—that is, it must communicate with the lumen of the vessel. In the ductus thoracicus, where the nodules are placed upon the free surface of the vessel lumen, this is always the case. In the compact foci of the veins, for instance the pulmonary veins, at least a portion of the focus must be softened or caseated.
5. The venous tubercle must not be located in the portal system, otherwise the tuberculous poison would all be deposited in the liver.

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[1] In this article the term primary lesion refers to the primary vascular lesion, *i. e.*, the inciting lesion of the miliary infection.

We see that when these postulates[1] were made the term as well as the fact tubercle bacillus was unknown, and it is with pardonable pride that Weigert reminds us that in his succeeding arbeit he was able to say, "It is only necessary to substitute the word tubercle bacillus for tuberculous poison." Following these publications of Weigert came a series of observations, all of which confirm his original findings. Of special interest we note that in the dissertation of Brasch, 1889, one of his students, an explanation of the manner in which the tuberculous infection of the ductus thoracicus is elaborately set forth. Here the infection is supposed to occur through the lymph-space by direct absorption from the pleural surface, or from the peritoneal surface, and is rendered possible by the absence of lymph-nodes from the course of the lymph-vessels. Although tuberculosis of the pleura and peritoneum are common; it does not necessarily follow that a tuberculous infection of the ductus thoracicus follows, many reasons for which may be enumerated. Of these, those tabulated by Wild seem to possess significance. The surfaces of the serous membranes are not as pervious to organisms as one might suppose; in fact, the membranes appear to possess a distinct ability to filter out the bacteria. This very probably occurs in tuberculous pleurisy, where masses of bacilli can be found upon the surface of the continuous epithelial covering of the membrane, the accumulations being especially great in the folds of the membrane. Where the direct transport does occur the tendency of the bacillus is to produce an obliterating process in the lymph-vessels, so that its progress when not sufficiently rapid would be impeded if not prevented. For this reason the explanation offered by Brasch of the mechanism of the production of miliary tuberculosis following tapping of the pleural cavity in tuberculous exudation appears distinctly rational. The sudden change in intrapleural pressure would naturally cause a distinct disturbance in the communicating lymph-spaces of the pleura, and it is entirely feasible to conceive that such sudden change might result in the establishment of a current toward the ductus thoracicus and the transportation of numbers of bacilli into that vessel. Baumgarten has gone even farther than Weigert, and believes that the bacilli can pass the lymph-nodes, especially when, after their lodgement in the lymph-node, they have proliferated. Hanau has, however, refused to accept this hypothesis. By all means the most common location for the primary focus in miliary tuberculosis is in the pulmonary veins. Here it was that Weigert first met with success, and it is in the pulmonary veins that by far the greatest number of lesions are observed. Weigert's first observations were naturally made without knowledge of the tubercle bacillus, and it was only after its discovery, in fact during the last few years, that careful investigation of the primary vascular lesions has led some observers to question whether or not it is possible to accept in full his deductions. As a result of these investigations, apparent discrepancies in the solidity of the doctrine have been brought to light, and it is with these and the discussion which they have provoked that we shall deal, although somewhat shortly, this evening. The principle apparent objection which has been quoted against the observations of Weigert is that the percentage of cases in which the lesion has been positively identified is too low. Wild, a student of Ribarts, in a dissertation upon the subject, claims that the statistics of all these cases so far published show, when viewed from the minimum stand-point, but 50 per cent. of positive results. Weigert states, in a succeeding reference to Wild's publication, that in all his cases he now has a record of 70.8 per cent. The balance, he says, may be readily explained by the difficulty surrounding the determination of a lesion in the vessel walls, which may be minute and, by the inaccessibility and the impossibility of dissecting the entire circulatory system, escape notice. He says that when Wild believes this percentage to be too small he has no idea of the difficulties which surround the detection of the primary focus. In view of this statement of Wild's I take satisfaction in stating to you to-night that my former chief, Dr. George Schmorl, Prosector of the Staatkrankenhaus in Dresden, and who has at his disposal one of the richest materials in Europe, from 1200 to 1500 autopsies per annum, has authorized me to state that the percentage of cases of miliary tuberculosis in which he has positively located the primary lesion, of which he has had more than one hundred, is above 95 per cent. When one has seen the wonderful dexterity by which it is possible for a competent observer to detect these lesions he may readily understand that in the hands of less careful observers the percentage could readily be below 50. The second exception which Wild takes to Weigert's doctrine is that the number of bacilli found in the primary foci are seldom sufficient to account for the millions of tubercles with which the body is permeated in well-developed miliary tuberculosis; that in many of the lesions described in the literature the organisms were not located on or near the surface, and in consequence they could not have come in contact with the blood current. It is true, and this Weigert especially notes even in his earlier publications, that in many cases but few tubercle bacilli are present; but he says, with much justice, that from his stand-point it was a matter of secondary importance to determine how many bacilli were present in the lesion at the time of the discovery, for the reason that from this it would be entirely impossible to determine how many bacilli were present in the lesion before the moment when they were swept into the blood stream and produced the miliary tuberculosis. Secondly, he states the well-known fact that carbol-fuchsin does not stain all of the bacilli in the tissue. It is well to add that a section through such a focus is no criterion of the number of bacilli which are present in the lesion. In his earlier publications Weigert sought to explain this apparent discrepancy by the assumption that the foci might contain innumerable spores of the tubercle bacillus. As we to-day know nothing of the existence of the so-called tubercle spore, Weigert has voluntarily withdrawn this explanation. A third statement which he makes is that in many cases, without doubt, the lesion which was found and described was not the primary vascular lesion, but that the observer, having found a tubercle of the vessel wall, rested satisfied, and thus overlooked the primary tubercular erosion. As to the solidity of Wild's criticism, it is pleasing to be able to add a trifling personal observation. I have seen at least a dozen cases where the primary erosion could be demonstrated, and have made from the surface of each erosion cover-slip preparations by taking up a small amount of fluid or softened exudate material with a platinum needle, and spreading and staining it after the usual methods. In such cases I have invariably found the field massed with tubercle bacilli, whereas in cut sections of such lesions the number of bacilli found was small. I think this observation rather indicates that Weigert's supposition that large numbers of bacteria had been previously swept away, as indicated by the fact that the surface of the lesion is distinctly richer in micro-organisms than the deeper portions, is correct.[1] In the ductus thoracicus it not infrequently occurs that the thrombi which are formed contain innumerable masses of the organism, and I have placed under the microscope a section taken from a case of Dr. Schmorl's, in which you may see that in this case it requires no effort of imagination to comprehend the method of the production of the miliary tubercles. Wild has quoted these facts in order to weaken the statement made by Weigert that miliary tuberculosis always springs from a lesion of a vessel, and that the tubercle bacilli must have been present in the lesion in sufficient numbers to have accounted for the miliary eruption. He assumes to supply this deficiency by the hypothesis that, although miliary tuberculosis in many cases follows tubercular erosion of the vessels, in such cases the bacilli need not have been carried into the blood stream in sufficient quantity to produce the miliary infection, but assumes they may proliferate in the blood to sufficient numbers to account for the innumerable miliary foci. To strengthen this argument he quotes the work of Wissekowitz upon the injection of organisms into the circulation of animals. Wissekowitz found that non-pathogenic organisms injected into the blood stream of animals were carried to the lymph-nodes and larger glandular organs, there deposited, and ultimately perished. The pathogenic organisms, he found, followed the same course; but instead of perishing they proliferated in the organs and later reappeared in the circulation, steadily increasing until the death of the animal. Wild believes that such a mechanism may well be supposed to belong to the production of miliary tuberculosis, and that we need not look to primary foci for the supply of sufficient numbers of the bacilli to account for the innumerable tubercles. He adds that the miliary tubercles are not always of the same size and character, and that the process may extend over a somewhat protracted period of time; in fact, may run a course as long as eight weeks before the death of the patient. Furthermore, Wild calls attention to the fact that another condition beside the passage of tubercle bacilli into the blood stream must be fulfilled before a miliary tuberculosis results. He states that it is possible for bacilli to not only be carried with the blood stream, but be deposited in organs, and there produce no active change, as witnessed by the observations of Jani, who found in the testes of healthy individuals tubercle bacilli lying in the tissue, and there producing no apparent reaction. Wild reasons from this that there must be a disposition on the part of the patient to tuberculous infection before it is possible for the bacilli, even after entering the blood current, to produce the miliary infection. He states that Orth explained this apparent discrepancy in the activity or non-activity of the organisms on the theory of virulence of the micro-organism, and concludes his argument by quoting the observation of Koch and others, who have found in lymph-nodes, in direct contact with the lymph stream, especially in the perivascular lymph-spaces, enormous accumulations of tubercle bacilli, which had every appearance of being the product of proliferation. He assumes thereupon that it is impossible to explain the production of miliary tuberculosis in all cases by the rupture of a tuberculous focus into the blood stream. First, because in a large percentage of cases they are not found, and in these cases he would assume that the bacilli had been absorbed through the pulmonary capillaries or other portions of the capillary system; that although in small number they have been carried into the organs and lymph-nodes, where they have proliferated, and thence, re-entering the circulation, have produced the miliary infection. Second, it is not necessary that the primary focus should show evidence of the entry of large numbers of bacilli into the bloodvessels, as it is possible for the bacilli to proliferate in the bloodvessels or in the larger organs until of sufficient number, and by this means produce miliary eruption. Weigert answers these criticisms, as I have already stated, by quoting that the percentage of cases in which the lesion is not found is relatively small compared with the difficulties which surround their detection. And I have told you to-night of the remarkable percentage which Schmorl has attained by the exercise of great manual dexterity. He says further that a miliary tuberculosis which requires eight weeks for its development is no longer a miliary tuberculosis, and in the cases which occur in which the whole process lasts but a day or two it is impossible to conceive of an explanation other than that the bacilli have been swept into the circulation at one time. He makes the statement that Wild has overlooked the fact that Orth had withdrawn his theory that special virulence of the tubercle bacillus was necessary in the production of miliary tuberculosis, and that Orth, in the last edition of his text-book, had indorsed Weigert's doctrine. He likewise states that a primary rupture of tuberculous material into the vessels has never been found without an accompanying miliary tuberculosis, and, likewise, tubercular infection of the ductus thoracicus has never been observed independent of a general miliary infection. He takes exception to the application of the argument of Wissekowitz, and reminds us that bacteriological investigations show that the tubercle bacillus does not find an especially favorable medium in the blood, and that the supposition that the organism proliferated enormously in this medium is entirely without experimental support.

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[1] The accuracy of the fifth postulate of Weigert is correctly questioned by Wild, who observes that there is no reason for considering the liver to be a bacterium-proof filter; and as Weigert makes no reference to Wild's criticism, it is probable that he no longer holds to this theory.

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[1] The form of vascular lesions to which this deduction especially applies usually shows excavations of their surfaces marking the site of previous caseous material which has been carried away. Large numbers of bacilli in the floors of such excavations rather indicate that the disintegrated caseous mass was rich in organisms.

There still remain forms of miliary tuberculosis, especially those following operation upon older tubercular foci, which may be said to have a form of traumatic origin. Bergmann qualifies such occurrences by stating that they may not in justice be said to have taken place except when, first, general symptoms of depression and the disease occur in the patient directly after the operation. Secondly, when the clinical symptoms and anatomical findings coincide, and, thirdly, when no other possible primary focus may be found. We see from the limitations which Bergmann has placed upon the traumatic form of miliary tuberculosis that their occurrence must be exceedingly rare, and that even then there is nothing about the mechanism of their production, if such occur, that in any way interferes with the complete acceptance of the doctrine of Weigert. Again, Wild quotes the miliary tuberculoses occurring after injection with Koch's tuberculin of patients suffering from advanced chronic tuberculosis. This phenomenon Virchow has explained as due to the breaking down of caseous foci resulting from the specific action of tuberculin. It does not exclude the possibility of the presence of one or more lesions of the vessels, which, through rapid disintegration induced by the tuberculin, could produce the infection of the blood current.

I think, in closing this short review of the controversy, that we may in fairness state that the explanation offered by Weigert for the apparent discrepancies in his own doctrine, as well as the statistics of others, indicate that we are perfectly safe in accepting postulates one to four of his doctrine, and that he has successfully met the criticism of both Wild and Ribart.

REVIEWS.

THE MINERAL WATERS AND HEALTH RESORTS OF EUROPE. By HERMANN WEBER, M.D., F.R.C.P., and PARKES WEBER, M.D., F.R.C.P., etc. 8vo., pp. 524. London: Smith, Elder & Co., 1898.

THE authors of this work have rendered great service to medical literature. Hermann Weber, the father of the junior author, is now in his seventy-sixth year, and although born and educated in Germany, has long been a resident of London, and for over forty years has been prominently identified with the Royal College of Physicians. At the outset of the present year Her Majesty Queen Victoria conferred upon him the honor of knighthood. Sir Hermann Weber is therefore now in that choice list of British subjects whom the Queen delighted to honor. The son, F. Parkes Weber, bears an honored name, and upon him, no doubt, has fallen in a large measure the burden of this very complete volume. The present publication is a revised and enlarged edition of the *Spas and Mineral Waters of Europe.* We scarcely realize in America to what an enormous extent hydrotherapeutics is employed in European countries. With the exception of a few fashionable resorts and perhaps a dozen mineral waters that have been successfully introduced in this country, the very names are unfamiliar. The authors have gathered from every corner of Europe information as to waters and watering-places; what they are and for what purposes useful; how to reach them and what resident physicians may be employed—in fact, everything relating to mineral-water resorts, climatic and hydrotherapeutic treatment, diet, exercise, and general regimen.

Speaking of the necessity for some knowledge of the character and qualities of the local medical men, the authors well say that success depends not only on an "intimate knowledge of the disease and the constitution, but on a certain sympathy, in the wider sense of the word, which arises from an insight into the mental condition and character of the patient, and which enables the doctor to put himself into accord with him and express his advice in such a way that it induces the patient to follow it. It is therefore necessary to find, if possible, a doctor at the spa who is conscientious, intelligent, sympathetic, and firm. Shakespeare would have been the greatest physician, and among recent doctors Sir William Gull owed his greatest success to such qualities."

The resident physician at a health resort doubly needs them, for, as a rule, he meets his patient in the sick-room for the first time. The idiosyncrasies of the invalid, the long history of illness, must be met by peculiar qualities in the attendant; therefore, a guide, such as this work, enters into details as to persons and places that must afford great satisfaction to both the patient and his physician.

The waters are classified as simple; muriated or common salt waters; simple alkaline waters; muriated alkaline waters; sulphated alkaline waters; sulphated and muriated sulphated waters; iron, arsenical, sulphur, and calcareous waters, etc. There is also a chapter on grape cures, milk and whey cures, and sanatoria for the treatment of phthisis.

Appended is a valuable and extensive bibliography, in which only two American names appear—those of Trudeau and Solly. Solly's work on climatology contains a valuable chapter on European resorts, and presents the American resorts in a manner which compares very favorably with the work of the Webers on Europe.

Americans do not visit American mineral springs as much as they did fifty years ago, when we take into consideration the growth of the nation. The summer exodus is to the seaboard, and resorts like Saratoga and the famous White Sulphur Springs have seen the day of their pre-eminence. On the other hand, people nowadays drink their mineral waters at home, and the consumption of domestic and imported medicinal and table waters is enormous, and is steadily on the increase. Our present consumption of domestic waters now amounts to about twenty-five million gallons, valued at nearly five million dollars. We use three million gallons of imported mineral waters each year.

The authors consider special diseases in the closing chapters, and are conservative as regards the result of treatment. For example, they say: "Syphilis is only to a very limited degree amenable to balneo-therapeutic treatment; ordinary methods of treatment are required. The idea that hot sulphur or other thermal waters can cure it is without foundation." Regarding diabetes mellitus, they speak of the waters of Vichy, Neuenahr, and Carlsbad, and add: "Their application, however, is limited. No complete and permanent cure of established diabetes is known to us for spa treatment; but fair results, such as great temporary improvement, which were regarded as cures, have often been obtained, and are frequently obtained now."

"The management of diet, attention to muscular exercise, and regimen in general have the greater share, and the patient much more readily submits to such management at a spa away from home."

"Phosphaturia is often a cause of great anxiety to students and men of sedentary habits. Spa treatment is rarely required; an increased amount of open-air exercise is frequently sufficient to remove the trouble."

The book abounds in practical suggestions; it tells what to do and what not to do, and ought to be in the hands of every practitioner, whether he has been accustomed to use mineral waters or not. He would then, no doubt, use them more and use them more intelligently.

G. H.

THE CRYSTALLINE LENS SYSTEM: ITS EMBRYOLOGY, ANATOMY, PHYSIOLOGICAL CHEMISTRY, PHYSIOLOGY, PATHOLOGY, DISEASES, TREATMENT, OPERATIONS, AND AFTER-CHANGES, WITH A CONSIDERATION OF APHAKIA. By LOUIS STRICKLER, M.D. Cincinnati, Ohio.

IF the assertion which is made by the author in his preface be true—"that the great majority of English-speaking ophthalmologists are ignorant of Becker's classical writings on the crystalline lens"—then his work has been justified, and the elaborate compilation which he has presented will be acceptable and of value to the profession. The volume before us is a faithful exposition of Becker's views as presented by him in *Die Pathologie und Therapie des Linsensystems*, 1877, and *Zur Anatomie der Gesunden und Kranken Linse*, 1882, and contains, in addition, a most comprehensive review of all that has been published upon the lens since that time. The reviewer, however, questions the value of compilations of this kind, and fears that the ophthalmologist who has not already familiarized himself with the writings of the master will scarcely care to peruse the often dry and second-hand statements of the abstractor.

The profession at large will probably find but little to interest them in a work which deals with a purely technical subject in the language of the specialty to which it belongs, except in so far as it treats of the manner in which the general system may be implicated in the origin and development of opacities of the lens.

It may not be amiss, therefore, to note if the author has been able to refer the cause of cataract to any systemic affection other than the rare instances in which the lens becomes clouded in diabetes. The author, however, seems to have rather neglected this particular phase of the subject, and while he mentions that chronic nephritis may give rise not infrequently to diseases of the deeper tunics of the eye, he does not think it possible to trace any causative relationship between renal disease and cataract. He does not mention the influence of gout in favoring the development of cataract by inducing changes in the choroid and ciliary body, the sources of nourishment of the lens, nor does he call attention to the possibility of uncorrected errors of refraction favoring lenticular haze by inducing changes in the same structures.

In view of the cures of cataract without operation, which have been much advertised of late by certain sanitariums, a word concerning the so-called "absorptive treatment" may not be out of place here. Outside of the rascality which is practised in duping many of the victims of such institutions by the temporary improvement in vision in cases of nuclear cataract, by a dilatation of the pupil with atropine, advantage has undoubtedly been taken of the fact that it is possible in a limited number of cases to retard further degeneration of the lens, or even to induce a partial restoration of transparency in it by a strict regimen of the diet and life of the patient and by the careful correction of all refraction errors. This is particularly true of those forms of cataract which are seen in diabetic, gouty, and rheumatic individuals. There is reason to think, therefore, that many of the improvements in vision which have been reported in these institutions resulted from the rest and attention which the patient received while there. It is well to remember, therefore, that one of the first requisites in the treatment of cataract should be to try and discover if there be anything in the manner of the life of the individual which would tend to interfere with the proper nourishment of the lens; and here the case often passes beyond the province of the ophthalmologist into that of the physician.

The cure of cataract is necessarily, however, almost always a surgical procedure, and consists in the removal of the crystalline lens from the eye, and so brilliant has been the success of modern ophthalmologists in the performance of this operation that it seems not amiss to mention some of the statistics of the results which attend their efforts.

The latest authoritative statement upon the subject is from Knapp

(*A System of Diseases of the Eye*, by Norris and Oliver, vol. iii. p. 818). This author shows that of 600 favorable cases satisfactory vision was obtained by the removal of the lens in 95 per cent., moderate vision in 3 per cent., and complete failure in but 2 per cent.; and of 400 cases, which comprised fifty-seven eyes with serious bodily or ocular complications, good vision was obtained in 90 per cent., moderate vision in 7 per cent., and only 3 per cent. were total failures.

When one reflects upon the extreme delicacy of the anatomy of the eye, and the nicety which is demanded in the performance of so difficult a procedure as the removal of its lens, we cannot help but admire the skill which is employed and the high degree of perfection which is attained by ophthalmologists in restoring one of the most essential of the faculties to so many of the individuals in the community.

The author has appended a bibliography which contains 3433 references, and which brings the literature of the subject up to date. The whole treatise shows that the vast literature has been extensively, and, as a rule, judiciously utilized, so that it will become a valuable work of reference to the ophthalmologist. W. C. P.

A MANUAL OF PHYSIOLOGY, WITH PRACTICAL EXERCISES. By G. N. STEWART, M.A., D.Sc., M.D. (Edin.), D.P.H. (Camb.). Philadelphia: W. B. Saunders.

THE third edition of this *Manual* shows numerous alterations in the text, while a great many experiments have been added in the practical exercises. The book is splendidly arranged, and shows the tendency in the teaching of this subject at the present time. One might as well teach anatomy or chemistry without practical work as to attempt to give instruction in physiology without practical exercises.

The subject is presented in an unusually attractive, clear, and forcible way, and the practical experiments are arranged so as to make the matter of the text clear and impressive. Many of the experiments are too difficult to be performed except under the direction of a demonstrator. All the subjects are treated very evenly. The text is very well suited for busy medical students, as it does not go too much into details and yet presents the subject completely.

The book opens with a brief introduction on the functions of living matter, and then follows a practical exercise on proteids, carbohydrates, and fats. It would have been an advantage to have given first some consideration of these important food-stuffs in the text, and to have extended the practical work of this exercise. This is very important for medical students, for few medical schools, at least in this country, have separate chairs of physiological chemistry.

The circulating fluids of the body are next taken up, and that part on coagulation of the blood deserves special mention for conciseness and clearness. The author inclines to Lilienfeld's theory as to the formation of thrombosin from fibrinogen in the conversion of the latter body into fibrins.

The chapters on Circulation and Respiration are very good. In the former the author presents his own ingenious method of measuring the circulation time, which gives very much more accurate results than former methods.

Digestion receives careful consideration in the text, but the practical exercises on this very important subject might be somewhat extended with advantage. The plates showing changes in gland-cells from secretion and in intestinal epithelium during absorption are very good.

The subjects of Nutrition, Dietetics, Excretion and Secretion, which are ordinarily so difficult for students to grasp, are presented in a way that can easily be followed and understood, and at the same time impress the vast importance of these subjects in practical medicine. While it is pointed out that uric acid does not lie on the direct line of metabolism from proteid to urea (p. 437), yet its relation to nucleoproteids and the xanthin-bodies does not receive sufficient consideration (p. 388) to show their close connections.

Internal secretions are rather briefly treated, especially that of the thyroid gland. Wise conservatism is shown in not accepting as established, as is too often done, the statement that the symptoms of athyroidea are due to the removal of the parathyroids, and not of the thyroids proper.

In discussing animal heat the author mentions the well-established fact that injuries of certain parts of the central nervous system will cause rise of temperature and disturbance of heat regulation, but does not call every such area " a heat centre," with functions more hypothetical than proven.

The author states in dealing with nerve and muscle that at least some voluntary contractions are not tetanic in nature. It has always been hard to explain the shortest voluntary movement as a tetanus, and this is certainly a step in the right direction.

A separate chapter is given on Electro-physiology. This is of questionable advantage in a book of this size, intended for medical students, as much of it could be omitted and the electrical phenomena of nerve and muscle could be introduced with those subjects.

Speaking of the degeneration of nerves and muscles, the statement is made (p. 586) " the ' reaction of degeneration ' is only obtained when the lesion is situated below the level of the cells of the anterior horn." Doubtless it was intended to include these cells also.

It is pointed out that the evidence formerly adduced to prove the existence of specific trophic nerves fails in its purpose, and that specific trophic nerves do not exist. This does not prove, however, that the nutrition of the tissues is not under the influence of impulses coming from nerve centres. In this connection it is stated (p. 588) that " the nutritive alterations in muscles and salivary glands after section of motor and secretory nerves seem to depend largely on functional and vasomotor changes." Later, however, in discussing the centres of the spinal cord, it is admitted that it is difficult to understand the degeneration of muscle after section of its nerve except on the hypothesis that impulses from the cells of the anterior horns influence their nutrition. It certainly is difficult to explain these changes, or those changes occurring clinically when these cells are involved by disease, except on such an assumption.

The central nervous system is well presented. Following Shäfer, the author applies the term *neuron* to the axis cylinder process or axon given off by the nerve cell. It is a very great misfortune that there is not greater uniformity in our nomenclature. It would seem much better to apply the term neuron to the unit of the nervous system—the cell with all of its processes.

Altogether the book is a very good one—for students' purposes perhaps the best we have. It will also be quite as useful to the practitioner, being concise and complete, and at the same time abreast of the times, containing the results of progress made in this branch in recent years. The fact that it has reached the third edition in so short a time indicates the favor with which it has been received in the past. With its improvements it will doubtless give still greater satisfaction in the future. W. S. C.

ATLAS DER SYPHILIS UND SYPHILISAEHNLICHEN HAUTKRANKHEITEN FÜR STUDIRENDE UND AERZTE. Von DR. MED. MARTIN CHOTZEN, Heft xi., xii. Hamburg and Leipzig: Leopold Voss, 1898.

ATLAS OF SYPHILIS AND SKIN DISEASES RESEMBLING SYPHILIS.

THESE two parts, containing thirteen plates, presenting twenty-two portraits of various syphilitic lesions and lesions resembling syphilis, complete this excellent *Atlas*. The greater number of the portraits are those of the late lesions of syphilis, such as serpiginous ulcer of the scalp and forehead, paronychia and ulcerating onychia, ossifying periostitis of the legs, the last being an excellent reproduction of a skiagraph. Four plates are devoted to the lesions of hereditary syphilis and one to syphilitic affections of the larynx and eye. Upon the whole the plates are quite up to the standard set in the preceding parts, which have already been noticed; and the *Atlas* will be found a very useful aid in recognizing syphilitic diseases and in distinguishing them from those affections which are apt to be mistaken for them. M. B. H.

THE AMERICAN YEAR-BOOK OF MEDICINE AND SURGERY: BEING A YEARLY DIGEST OF SCIENTIFIC PROGRESS AND AUTHORITATIVE OPINION IN ALL BRANCHES OF MEDICINE AND SURGERY. Drawn from journals, monographs, and text-books of the leading American and foreign authors and investigators. Collected and arranged with critical editorial comment under the general editorial charge of GEORGE M. GOULD. Illustrated. Philadelphia: W. B. Saunders, 1899.

IN examining the current issue of the *Year-book* we are impressed first with its value as an illustration of certain general movements in medicine. Thus in the infectious diseases we note that the literature of yellow fever for the past year has been much more extensive than usual, whereas the literature upon bubonic plague, which had been occupying so much attention and which filled such a considerable space in the *Year-book* for 1898, has diminished very considerably. The editors of the section on General Medicine insist more strongly than ever upon the value of the Widal reaction. In particular it has led to the recognition of the frequency of typhoid infection without the characteristic intestinal lesions. Probably it was impossible, on account of its recent appearance, to pay any attention to the work that has been done in tropical disease as a result of the recent Spanish-American war, but we shall expect to see this in the succeeding issue. A slight error in arrangement is noted in the section on Infectious Disease—that is, the inclusion of cases of streptococcic infection under the head of relapsing fever. In the section on Tuberculosis there is further confirmation of the apparently very doubtful utility of sera employed therapeutically. The results of some of the recent work upon metabolism are also noted. In the section on Surgery we are most impressed by the paramount importance of the work upon the gastro-intestinal tract, almost one-half of the abstracts being devoted to this branch. In the other sections it is of interest to note the increased amount of work devoted to obstetrical pathology and the growing conservatism of the gynecologist. The nervous section is well written, but many valuable articles have unquestionably failed to receive recognition, and we believe that they might well have replaced some of the abstracts that have been inserted. Thus, a cursory examination of the references failed to reveal any to the *Archiv der Psychiatrie*, perhaps the most important neurological journal published; nor were other leading foreign journals cited as frequently as would seem to be desirable. The sections on Physiology and Legal Medicine are remarkable examples of condensation, particularly the latter, Dr. Johnson appearing to have read pretty nearly everything in his province and noted it, if only in a very few words. The illustrations are rather various in value, the result, of course, of the fact that they have been obtained from very different sources. Nearly all of them are good, although we think that Plates I. and IV. are decidedly less successful, and certainly less illustrative than the others. The plates taken from Ziegler's *Beiträge* are very beautiful, and the one illustrating Dr. Posey's article on Congenital Malformations of the Iris is very clear and satisfactory. Of course, a certain number of repetitions are inevitable, but it seems that Zeehuisen's article on a method of dilating the œsophagus need not have been abstracted at length in two sections. The most serious defect in the work is, we believe, the absence of any indication, excepting a sort of apologetic note in the preface, of the period of time represented by the literature in the present volume. Of course, one can form a pretty good idea of what this is from the dates of the references, but it would be far more satisfactory, we believe, both to the editors and the readers, if the latter knew just what limits were determined upon, and therefore could understand why certain articles were omitted. We have more freedom in speaking of blemishes in this work than we should have deemed justifiable in regard to another, for it is practically indispensable to a physician who has any desire to keep himself familiar with current medicine in more than a single small branch. Medical literature is at present so abnormally enormous that without some satisfactory *résumé* no one can hope to keep even approximately abreast of it. It is a pity, we think, that some method has not been devised whereby books as well as articles could be treated in this manner; but the difficulties in the way of such an undertaking are obviously considerable. There is no question that the *American Yearbook of Medicine and Surgery* is superior to any similar publication in the English language, and for convenience and compactness easily surpasses its German rivals. Sometimes, indeed, we feel that compactness has been slightly overdone, but this is certainly a fault in the right direction. The work can be cordially recommended. J. S.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Phlegmasia Dolens, or Milk Leg, in Typhoid Fever.—J. M. Da Costa (*Boston Medical and Surgical Journal,* March 23, 1899) considers this interesting complication as illustrated by soldiers admitted to the Pennsylvania Hospital. Phlegmasia dolens is not a common occurrence in typhoid fever. The general percentage of cases showing this complication in the hospital was not over 1 to 2 per cent. Murchison, in his treatise, estimated it at 1 per cent. There were, however, thirty cases, or almost 14 per cent., among 215 cases of typhoid fever in soldiers admitted to the hospital. In eighteen of these thirty cases the left leg was affected alone in three, the right alone in two, and both in thirteen, the latter generally beginning on the left side when not appearing simultaneously in both. Da Costa thinks that the greater tendency of this complication to occur in soldier patients may possibly be attributed to relaxation with distention of the venous system in the legs, due to marching, thus predisposing them to the disease. The cases occurred in those patients in whom the typhoid fever had been very severe, and generally at the end of the fever. He thinks that the primary factor in the etiology of the disease is a thrombosis of the veins, and not a phlebitis or periphlebitis, as was promulgated by Sir James Paget. Da Costa thinks that the phlebitis is a secondary process, the thrombosis being primary. The cases should be treated by elevation of the leg; application of compresses wet with lead and opium lotion, or witch-hazel distillate; laxatives, in constipation; in persistent pain, belladonna plaster strips along the veins; absolute rest in bed; continued mechanical support of bandages, etc., after the patient gets out of bed, until the veins recover their tone and all symptoms of obstruction are past. Massage should be avoided as long as there are signs of venous disturbance.

Antitoxin Treatment of Diphtheria.—The results obtained from the use of antitoxin in diphtheria, as published in the February *Bulletin of the Department of Health*, city of Chicago, should be sufficiently convincing to demonstrate to any skeptic the efficacy of this form of treatment.

From October 5, 1895—the date of the first administration of antitoxin by the department—to February 28, 1899, a period of nearly three and one-half years, a total of 6342 reported cases of diphtheria were visited by the department inspectors. Of this number 4311 were bacterially verified as true diphtheria, and 4076 were treated with antitoxin—the remaining 235 either refusing antitoxin treatment or being treated by other physicians, the results not being known. The results show 3795 recoveries out of the 4076 cases treated by the department. There were 276 deaths, and five cases were still under treatment at the close of February, 1899.

The figures of recoveries, 3795, and of deaths, 276, give a mortality-rate of 6.77 per cent. in 4071 cases of bacterially verified diphtheria treated with antitoxin.

The results for the four months previous to the publication of the *Bulletin* were even more favorable. During November and December, 1898, and January and February, 1899, 423 cases were treated. There were 398 recoveries, 20 deaths, and 5 remained under treatment on February 28th. The average mortality-rate was 4.78 per cent. in the completed cases. There was no death among 129 cases treated on the first or second days of the disease, and only 3 deaths among 114 treated on the third day—a mortality of 1.23 per cent. in 243 cases. Nine per cent. of the cases, or 38 in number, required intubation, with 30 recoveries and 8 deaths—a mortality of 21 per cent. for laryngeal stenosis, or less than two-thirds the mortality-rate of all diphtheria cases in Chicago prior to the introduction of antitoxin.

The further analysis of the 4071 cases of diphtheria is of interest. In 355 cases treated on the first day of the disease there was only one death—a mortality of only 0.28 per cent.; in 1018 cases first treated on the second day of the disease there were 17 deaths—a mortality of 1.67 per cent.; in 1509 cases first treated on the third day of the disease there were 57 deaths—a mortality of 3.77 per cent.; in 720 cases first treated on the fourth day there were 82 deaths—a mortality of 11.39 per cent.; and in 469 cases first treated later than the fourth day there were 119 deaths—a mortality of 25.37 per cent. These statistics show very conclusively the advisability of giving the antitoxin as early as possible.

The *Bulletin* states that the death-rate of 6.77 per cent. from diphtheria during the past three years, since antitoxin has been used, shows a decline of 43 per cent. as compared with that for the previous three years when other methods of treatment were in vogue. No evidence could be more convincing than this in favor of the efficacy of the antitoxin treatment.

Cerebro-spinal Meningitis Followed by Gangrene of the Feet.—W. P. MATTHEWS (*Medical Register*, Richmond, Va., March) reports a case of cerebro-spinal meningitis in which gangrene of the feet developed. The patient was a colored woman, aged twenty-five years. The illness began on April 22, 1898, with a severe chill, followed by intense headache and backache. Vomiting was a prominent symptom, and there was makerd stiffening of the back and neck muscles. Retraction of the head was marked. The pulse was slow, full, and bounding. The patient's condition gradually became worse, and stimulants were used freely. Improvement afterward set in until early in May, when gangrene of the toes of both feet developed. The feet were wrapped in compresses saturated with bichloride solution until a line of demarcation was established. It was necessary subsequently to amputate a portion of the phalanges and a part of the second metatarsal of the left foot. Matthews thought that the gangrene was due to the administration of ergot, which had been given in drachm doses every four hours at the beginning of the illness. The patient recovered.

Deep Reflexes of the Lower Extremities.—CHARLES K. MILLS (*Journal of Nervous and Mental Disease*, March, 1899) reports and discusses a case of loss of knee-jerk with retention of ankle clonus, in which the symptoms were due to a combination of muscular and nervous disease of somewhat uncertain pathology, although he suggests a toxæmia as the cause. He discusses the literature of the syndrome, which is limited, and offers the following conclusions as to its etiology:

1. The syndrome may be due to a compression by a destroying lesion, such as caries with pachymeningitis, or transverse myelitis, involving the spinal cord in the region of the patellar reflex arc, namely, somewhere between the second and fifth lumbar segments, and most probably the second or third lumbar segment.
2. The syndrome may be due to a disseminated sclerosis, foci of sclerosis being present both in the reflex arc for the patella and in the lateral columns.
3. The syndrome may be due to focal lesions, like hemorrhage, softening, or cavity formation, attacking points in the reflex arc, and also the lateral columns.
4. The syndrome may be due to peculiar forms of developmental arrest of the spinal cord, as, for instance, to defect in the gray matter of the lumbar segments and in the lateral columns.
5. The syndrome may be due to a combination of muscular and neural disease, as in my case and as was probably also the case in the man suffering from typhoid fever as recorded by Fleury. It is known that hyaline degeneration of muscular fibres occurs especially in typhoid fever. Fleury's case was probably in its pathology not unlike my own.
6. On theoretical grounds it seems probable that the syndrome might be due to a focal lesion in the cerebral cortex, or in the cortical spinal (pyramidal) tract, or to arrested development of the tract associated with disease (inflammation or degeneration) limited to the crural nerves and their muscles.

The article further discusses the question of the significance of the ankle-clonus in diagnosticating organic from functional disorders, especially hysteria. Mills, like Gowers, holds to the opinion that the presence of true foot-clonus is, aside from conditions with contracture, a symptom of organic disease. It is from hysteria in particular that this diagnostic is greatest, and the medico-legal bearings of the question are obvious. He admits that toxæmic conditions may be accompanied with this symptom, and that leaves open the way to a large number of apparent exceptions to this rule. There is no certainty that the symptoms of what we may diagnose as neurasthenia or hysteria may not in some cases include in their etiology a toxæmic element. Mills also discusses the patellar clonus, which he places in the same general category, as regards its diagnostic significance, as the ankle clonus, and tendo Achillis jerk in tabes. He gives some weight to this last symptom as aiding in the diagnosis in doubtful cases, though he apparently does not quite agree with Babinski that it is as important as Westphal's sign. Finally, he calls attention to the tendon and muscular reflexes in the diagnosis of encephalic tumors from tabes. When the muscle as well as the tendon phenomena are absent the diagnosis of tumors is more probable. In all the cases (twenty-eight) of tabes examined, the quadriceps and gastrocnemius muscle phenomena were present. He considers their absence in tumor to be due to a toxæmia excited by the growth.

The Localization of Cerebellar Tumors and their Differentiation from Chronic Internal Hydrocephalus.—RUDOLF SCHMIDT (*Wiener klin. Wochenschrift*, 1898, No. 51) observed two cases that seem to throw a useful light on this subject. In one case there was an angiosarcoma of the left cerebellar hemisphere; in the other a glioma of the right hemisphere, with compression of the aqueduct of Sylvius, and internal hydrocephalus. In both cases vomiting, vertigo, and tinnitus came on as soon as the patients lay on the right or left side respectively. The author looks on this as the result of compression of the aqueduct of Sylvius and the veins of Galen, and the regularity with which the symptoms appeared on assuming the lateral position give the observation the force of an experiment. The effect of position on the side indicates not only the asymmetry, but also a considerable degree of weight of the lesion, so that when the symptom is present a large tumor, and one near the median line, may be supposed to be present. The occurrence of symptoms of compression in the lateral position only is, therefore, of value in excluding chronic serous meningitis, which in many respects may present similar symptoms, and also median obstruction, such as cysticercus of the aqueduct or the fourth ventricle, and also hysteria. The author also found the knee-jerk absent in his cases, and thinks this sign may also be of value in the differential diagnosis of cerebellar tumors and chronic internal hydrocephalus.

On the Efficiency of the Fatty Degenerated Heart.—HASENFELD and VON FENYVESSY report some interesting experiments (*Berliner klin. Wochenschrift*, 1899, No. 7). They summarize their conclusions as follows: 1. Even severe degrees of acute fatty degeneration of the heart-muscle cannot be recognized during life, because the degeneration does not materially influence the cardiac functions and does not cause any striking symptoms. 2. The efficiency of the heart-muscle with acute fatty degeneration, whether of high or low degree, is not notably affected. The acutely degenerated heart-muscle is not only able to respond to the usual demands on its strength as well as the normal heart, but it is also able to furnish an extra amount of work. 3. Only shortly before death can signs of loss of compensation be observed in a heart degenerated by phosphorus. Even with intense degeneration, however, the heart could still be stimulated by adrenal extract, for the heart-muscle in phosphorous-poisoning is much more sentitive to lack of oxygen than the normal. 4. Failure of the circulation in phosphorous-poisoning is largely due to weakening of the vasomotors. Pregnant animals bear phosphorous-poisoning very badly; even the parenchymatous organs of the embryos show fatty degeneration. These results the authors ascribe to the enormous amount of the accommodation of the heart-muscle, and they think it also possible that the heart, even in chronic degeneration, still has a sufficient functional ability. They also draw the conclusion from their experiments that the fatty degenerations most frequently found in the human body, especially those that are not of long duration, cannot be diagnosed, and that the condition of cardiac weakness, so often observed, cannot be referred to fatty degeneration of the heart-muscle. They do not deny that there is a relation between the degneration and the loss of compensation, but think that in most cases the degneration is the result and not the cause of the loss of compensation. Certain it is that a number of causes of fatty degeneration have no effect on the force of the heart, and it is quite possible that certain substances that cause a fatty degeneration can also weaken the strength of the heart. It should be added that the changes the authors have considered are only the parenchymatous ones. They believe that the interstitial changes are much more injurious on the reserve force of the heart than parenchymatous degenerations.

Thrombosis in Pulmonary Tuberculosis.—RUGE and HIEROKLES (*Berliner klin. Wochenschrift*, 1899, No. 4) examined the clinical records of 1778 cases of phthisis, and found the complication of venous thrombosis 19 times, or fully 1 per cent. Undoubtedly this complication is more frequent than these figures indicate, since in many cases the clinical signs are not marked, and in autopsies the veins are often not examined. The œdema is often trivial, especially if the collateral circulation is quickly established. The pain at times may be slight or even absent. The age of the patients had a wide range: Between twenty and thirty years there were 6 cases; between thirty-one and forty years, 7 cases; and between forty-one and fifty years, 5 cases. One patient was sixty years old. Women seem especially prone to thrombosis. In this series there were 12 women and 7 men. The complication was usually found in severe cases of phthisis, and appeared, as a rule, two or three weeks before death, but in one case the patient recovered from the (femoral) thrombosis. The veins of the lower extremities were most frequently involved, after that the right ventricle and the pulmonary artery, and less frequently other veins. The authors give a brief résumé of the theories of thrombosis without committing themselves to any one. A useful bibliography is appended.

A Peculiar Case of Rupture of an Aortic Leaflet.—OSTWALT saw an old man with sudden blindness in one eye and with the typical picture of embolism of the central artery of the retina. The patient had atheroma and albuminuria with hyaline casts; the heart was irregular, and there was a diastolic aortic murmur. A week before the eye became blind the man had undergone a sudden strain, followed by very severe palpitation of the heart, and a pain in the inguinal region. This was followed a few days later by a hernia.

The blindness developed the day after the strain. On account of the physical signs and the time of occurrence of the symptoms the author rejects the idea of aneurism and of embolism from an old arterio-sclerotic patch, and concludes that an aortic leaflet had been torn at the time of the strain. He has been able to find references to twenty other cases of rupture of the aortic valve, including some overlooked in the study made by Barié in 1881. In most cases the cause was a severe muscular exertion, producing sudden elevation of the blood-pressure, especially in the aorta. If the valves are already weakened by disease, rupture is all the more probable, and in such cases can occur from very slight exertion, as rising from bed, but previous disease is not necessary. The rupture most frequently occurs at the insertion, rarely in the middle of the flap or in a radial direction. The symptoms of the rupture are usually such as severe pain, either in the heart region or between the shoulders. Palpitation, great irregularity of the heart's action, and dyspnœa are added. Cyanosis, cold sweats and œdema appear. In some cases fainting spells occur. The physical signs of insufficiency of the affected valve are present, the blowing murmur being especially characteristic, and sometimes audible at a distance. In cases like the author's, in which the symptoms improve, the murmur usually persists. But in the present case, and in one other, reported by Anstie, the murmur ceased also, and Ostwalt thinks that in both cases the torn place in the valve had healed. In a case with symptoms so mild as in the present one the condition would have been overlooked had it not been for the retinal embolism.—*Berliner klin. Wochenschrift*, 1899, No. 5.

On Achondroplasia.—FLEMMING (*The Bristol Medico-Chirurgical Journal*, March, 1899, p. 21) reports a case presenting the features of the interesting condition known as achondroplasia, or, as it is sometimes less properly called, fœtal rickets. The disease occurred in an eight-months still-born male child. Except for an enlarged abdomen, the trunk was normal. The head was large, soft, and shapeless. Only toward the base of the skull could any resisting bone be felt. The skin about the face and neck was much thickened. The chief deformity was in the extremities, which were very short in proportion to the trunk, markedly curved and bent, with relatively small hands and feet. The character of the deformities is described in detail. The skin was everywhere thickened. The thickening was in part due to an increase in the deeper areolar layer, and not merely to an increase in the subcutaneous fat. The tongue appeared too large for the mouth, similar to what is seen in sporadic cretinism. There was no gross nor microscopical change in the thyroid. The thoracic and abdominal organs appeared normal.

The cartilaginous epiphyses of the long bones were enlarged in every direction, and did not present the usual white line at their junction with the diaphyses. The bones were easily cut with a knife from end to end; the shafts of the long bones had merely a thin casing of bone, and the cancellous bone inside felt only gritty to the knife. The cranial bones were not stiffer than a sheet of writing paper. The clavicle and ribs, though soft, were normal in shape and size, and the pelvis showed no marked deformity.

After describing in detail the development of bone normally and that in achondroplasia, Flemming says: " It would seem, then, that while owing to some dystrophy the skeleton maintained for a long time its embryonic form, there was some special affection of the epiphyseal cartilage, whereby its ossification was not only delayed, but reduced almost to a minimum.

"While, then, the periosteum is forming bone, the cartilage on which the length of the bone depends is inactive, the consequence being that although the bone has a normal, or nearly normal transverse diameter, it is at the same time greatly reduced in length. Bones in the growth of which the cartilage takes but a small part, such as the clavicle and the ribs, are not shortened, and bones developed in the membrane are of natural size."

Achondroplasia is characterized by lesions of the skeleton, which are symmetrical and chiefly in the long bones; the latter are thick, short, hard, and compact, and where bent the bending is always in the diaphyses and in the same direction. It is not entirely a local disease of the bones, for it is accompanied by profound nutritional disturbances, in particular by a great thickening of the skin.

The affection does not involve the trunk or the head, except at the base of the skull, which is contracted and has the bones prematurely united. Some cases are, however, hydrocephalic. The disease comes on and completes its evolution in the earlier months of pregnancy, so that when the child is born the lesions are cured and the initial disorders escape notice. One authority, however, states that the disease may be active until the twenty-sixth week.

The bone when formed is very hard, and the epiphyses are greatly enlarged. The appearance of a case of achondroplasia suggests a cretinoid condition, if it is not actually a phase of sporadic cretinism. Flemming states that one of the interesting features of his case was the persistence of the disease until a very late period of fœtal life. He lastly gives the points which differentiate it from rickets and inherited syphilis.

F. H. Edgeworth, in discussion, presented photographs of achondroplasia in a man, aged fifty-nine years, whose height was only 4 feet 8 inches. The shortness of stature was entirely due to deficiency in the length of the long bones of the legs, the body being well developed. The etiology of achondroplasia is obscure. Thomson and Symington have shown that the essential skeletal abnormalities of the disease are of two kinds—premature synostosis of the basicranial axis and defective endochondral ossification—so that the diaphyses of the long bones are shorter than usual. They also pointed out that the only disease to which achondroplasia has a resemblance is sporadic cretinism. Edgeworth suggests that achondroplasia may be due to a disturbance of the function of the thyroid gland early in intra-uterine life, producing the characteristic skeletal changes. He believes that later the gland performs its function normally, preventing the nutritional disorders which are characteristic of sporadic cretinism.

The Heart in Chlorosis.—GAUTIER (*Deutsches Archiv f. klin. Med.*, Band lxii. Heft 1 and 2) has made an exhaustive study of the literature of this subject, and has carefully examined twenty-two cases. His observations on the heart were made by deep percussion, and noting the lateral extent, measured on both sides from the median line. The author's conclusions are as follows:

1. In twenty-two cases of chlorosis, in which no other cause for an altera-

tion of the heart was present, twenty showed an enlargement of the relative heart-dulness, which in a few cases was very marked.

2. This increase should be due only to an increase in the size of the heart.

3. The symptoms during and after the chlorosis allow us to assume that the heart was dilated and hypertrophied.

4. In some cases the enlargement subsided after the symptoms of chlorosis ceased; more frequently the heart remained enlarged for some time after, and slowly attained normal size.

5. The causes of the dilatation and hypertrophy culminate in those of the chlorosis itself.

6. In chlorosis there is a diminution of the functional power of the heart; the normal circulation offers such a heart unusual difficulty, and in consequence it becomes dilated and hypertrophied.

7. In chlorosis there is a convincing example of a transitory hypertrophy.

8. The pathogenesis of the cardiac hypertrophy in chlorosis indicates the importance of congenital or acquired power in the development of any hypertrophy of the heart.

Pyelonephritis and Ulcerative Endocarditis as a Complication of Gonorrhœa.—Berg (*Medical Record*, April 29, 1899, p. 602) reports the following case: A man, aged twenty-one years, was admitted to the Mt. Sinai Hospital, August 7, 1898, with a history of having contracted gonorrhœa twelve days previously. Nine days later, August 4th, he had a sudden chill, followed by fever and swelling of the metatarso-phalangeal joint of the left thumb. On August 11th he complained of pain and tenderness over the left kidney. There was great tenderness on palpation in the left lumbar region behind. Pus-cells and granular casts were found in the urine on the previous day. His temperature had been very high at intervals for several days. From the symptoms a diagnosis of septic (gonorrhœal) pyelonephritis was made. The chills persisted, and several convulsions occurred. On August 23d a loud, blowing murmur was heard at the apex for the first time. The second sound at the apex was enfeebled. Over the base of the heart there was heard a rough, blowing, systolic murmur, with absent second sound. This murmur was transmitted upward and downward, and was best heard over the upper portion of the sternum. Death occurred suddenly on August 24th.

An autopsy was performed, the main features of which were as follows: On two of the segments of the aortic valve there were large vegetations, with ulcerations. One of the flaps was perforated. Upon one of the segments of the mitral valve, about 1 cm. from the free border, there were two small, yellowish nodules. The spleen showed one small infarction. The pelvis of the left kidney showed a few hemorrhagic spots, about the size of pin-heads. In both pelves there was a small amount of whitish, turbid fluid. The kidney, on microscopic examination, showed the features of an acute pyelonephritis.

Blood-cultures were taken twice before death, with negative results. Gonococci were found in the cover-slips from the vegetations on the aortic valves. Diplococci, not stainable by Gram's method and believed to be gonococci, were also found in the fluid in the pelvis of the left kidney. Cultures were not taken from the heart's blood.

Berg states that for many years it was held that ulcerative endocarditis complicating gonorrhœa was due to a mixed infection with some other organism than the gonococcus. Since 1894, however, many competent observers have reported cases in which only the gonococcus was found in the blood and on the cardiac vegetations. Councilman, Gluzinsky, and Leyden have reported such cases. One of the most valuable cases was that reported by Thayer and Blumer. Not only was the gonoccoccus found on the heart valves, but it was grown in pure culture from the blood during life, showing that the gonococcus may pass by means of the blood current to distant parts of the body, and there give rise to infections.

PEDIATRICS.

UNDER THE CHARGE OF

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The Micro-organism of Scarlet Fever.—WILLIAM J. CLASS (*The Chicago Medical Recorder*, May, 1899, p. 373), referring to the unsatisfactory results of the investigations of Kleim, of Crajkowski, and of other careful observers in isolating a specific micro-organism of scarlatina, concluded that the fault lay with the culture media employed. After various failures he has succeeded in finding a medium on which he has been able almost invariably to obtain, both from the scales and from the throats of scarlatinal patients, the growth of an organism which presents such characteristic features, both in its morphology as well as in its growth, that he believes it to be the specific germ of scarlet fever.

It is a diplococcus resembling, as ordinarily seen on slides made from fresh cultures, a very large gonococcus. This biscuit-shaped appearance is best seen in specimens that have been but slightly stained. In these is also noted a transverse line running through each half of the organism, giving it the appearance of a tetrad. The size varies. It is always considerably larger than the ordinary pus microbe. Lancet-shaped forms, as occur in the pneumococcus, are never met; but streptococcus forms are occasionally, though rarely, observed, as are also single cocci. They have no capsule and show no spores. Specimens from pure cultures are satisfactorily stained by watery solutions of methylene-blue, by carbol-fuchsin, Bismarck brown, and Pitfield's flagellæ stain. They are decolorized by Gram's method, though not to the same extent as the gonococcus, the larger variety holding the stain somewhat better than the smaller.

The culture medium consists of glycerin-agar, to which is added about 5 per cent. by weight of black garden earth, previously sterilized by discontinuous heating. On this medium the scales of a scarlet fever patient are placed with a sterile platinum loop, and the tubes put in an incubator, the temperature of which is kept at about 35° C. Within forty-eight hours to one week small, whitish-gray semi-transparent colonies appear along the track of inoculation and around the scale. On agar-agar, glycerin agar, and gelatin there is no growth, and bouillon is not clouded. Milk does not appear to be affected, but the organism apparently multiplies in it. On potatoes there is no growth.

Rabbits and guinea-pigs were not affected by subcutaneous injection of pure cultures, by scarification and inoculation of the wounds produced, and by intra-abdominal injection.

The germ described has been cultivated from the scales of about thirty cases of typical scarlatina, and has also been found in the throats of these patients and in cases of angina occurring in persons exposed to scarlet fever in whom no eruption appeared, and lastly in the throats of children in a family where one member had typical scarlatina, the children being in normal condition when the culture was made, but subsequently developing a typical rash, in the scales of which the same organism was found.

Enormous Doses of Laudanum Taken by an Infant.—WALTER F. BOGGES (*Archives of Pediatrics*, May, 1899, p. 358) reports having seen a child of nine months, very small for its age, not weighing more than eight or nine pounds, but bright and well nourished. For six months the mother had been in the habit of giving it laudanum for colic, and had given from four to twenty drops of the drug five or six times a day—a total of one and one-half to two drachms in the twenty-four hours.

While under the influence of the drug the baby was very bright, but during intervals, when the effect had worn off, it would become fretful. Satisfactory recovery followed gradual but rapid withdrawal of the drug.

[It is possible, as suggested by one of those discussing the report, that the laudanum given in this case was what is called "half-strength," which is quite commonly sold across the counter to the laity. Even at this estimate the case is remarkable as showing how large a quantity of the drug a baby opium-habitué can tolerate.—ED.]

Treatment of Anæmia and Athrepsia in Infants by Hypodermatic Injection of Yolk of Egg.—MUGGIA, of Turin (*Revue mensuelle des Maladies de l'Enfance*, May, 1899, p. 240) uses for this purpose the yolk of freshly-laid hen's eggs carefully washed before opening. The yolks are received in a sterile glass vessel, are then weighed and mixed with a third of their weight of physiological solution of sodium chloride. The mixture is then agitated with a glass rod and filtered through absorbent gauze. The resulting liquid is of homogeneous consistence. The initial injection is 1 c.c., and is made beneath the skin of the buttocks or of the lumbar region. There is no local or general reaction, provided the rules of asepsis are carried out and the region of injection is slightly massaged. The quantity is gradually increased till a limit of 10 c.c. is reached. The duration of treatment varies according to the case, but should not be less than 20 injections of at least 5 c.c. each.

According to Muggia's observation, these injections increase considerably the body-weight of athrepsic infants, the percentage of hæmoglobin and the number of red corpuscles, and this much more rapidly than lecithin administered in the same way.

Modifications of the Blood in Scarlatina.—VAN DEN BERG (*Archiv f. Kinderheilkunde*, Band xxv. S. 321) has made a study of the blood changes in twelve cases of scarlatina observed in Baginsky's clinic. He finds that there exists always a hyperleucocytosis which reaches its maximum from the fourth to the sixth day after the onset of the disease, and lasts about thirty days. The degree is variable, but in general the number of leucocytes is two to three times that of the normal. Desquamation or fever exercises no appreciable influence upon the intensity of this leucocytosis.

The number of red corpuscles is increased, independently of the state of the temperature; often during desquamation evidences of degeneration of red corpuscles are observed. Hæmoglobin is at first increased; it then diminishes and subsequently increases again. The influence of fever here is variable—sometimes an increase, sometimes a diminution in the quantity of hæmoglobin. The modifications in the specific gravity of the blood are very variable. The relation between red and white corpuscles is either normal or slightly modified one way or the other.

Morphologically, the increase in leucocytes is made at the expense of polynuclear cells and intermediary forms. Ordinarily one finds 68 to 82 per cent. of polynuclear cells, and 16 to 28 per cent. of mononuclear forms. The number of eosinophiles varies, and ranges between 1, 3, and 8 per cent.

Diffuse Scleroderma Following Scarlatina.—TCHERNOFF (*Wratch*, 1899, No. 4, p. 93) has observed a case of diffuse scleroderma in a young girl as a sequel to a grave scarlatina which had been marked by hyperpyrexia, albuminuria prolonged for three months, endocarditis, and suppurative tonsillitis. The induration of the skin had begun at the acme of the disease upon almost the entire body at the same time, and when first seen by the author, nearly two months after the beginning of the fever, the patient was lying in the gun-hammer position, with all the limbs flexed, and complained of a sensation of being encased. The hands and feet alone were unaffected. The skin presented the appearance and consistence of that of a frozen corpse; the folds being effaced and movement over the deeper parts reduced to a minimum. The face appeared lengthened and its features immovable, the eyelids closing with difficulty. The tongue was thickened and coated, the sense of taste lost, and mastication painful; hearing was disturbed and cutaneous sensibility greatly diminished. The movements of the articulations were extremely limited, partly in consequence of the changes of the skin; but not altogether so, since the ankylosis persisted for a long time after the skin resumed its normal condition. The temperature was slightly subnormal.

The treatment consisted in daily warm baths, with massage and passive movements of the joints; and, later, gymnastics were added. Cure was complete at the end of six months of treatment.

The author has seen scleroderma develop in other children; also in a dyspeptic child of two years after bronchitis, the condition disappearing at the end of a month and a half by the same treatment. Another child, of four months, presented induration of the skin following a grave bronchitis. In this case also the skin returned to a normal condition as the health was re-established. In all these cases the scleroderma was partial; it was never associated with œdema.

Orthoform and Aneson in Painful Mouth Affections of Children.—GÖPPERT (*Jahrbuch f. Kinderheilkunde*, 1899, Heft 1) has used both these drugs with satisfactory results as a local sedative in painful mouth affections of children. The anæsthetic effect lasts about an hour and a half, and the application is best made about twenty minutes before eating. Aneson is applied by means of a wad of cotton to the inflamed mucous membrane, and orthoform may be dusted on by the powder-blower. Both drugs have an unpleasant taste, especially the orthoform.

Treatment of Croupous Pneumonia by Antidiphtheric Serum.—BESSONE (*Annales de Médecine et Chirurgie Infantiles*, February 15, 1899, p. 160), in a series of 100 cases of pneumonia, treated twenty-one by injections of antidiphtheric serum and the remaining seventy-nine by the ordinary methods.

Of the twenty-one thus treated seven reached the crisis prematurely between the third and fourth days of the disease; two on the fourth day, and three on the fifth. In seven, on the contrary, the crisis was retarded. One case died of concomitant tuberculosis. The immediate effect upon the temperature was not constant. Usually a slight elevation of the curve was noted. No effect upon respiration, pulse, or the nervous system was observed. No albuminuria was produced by the injections. The mortality with the patients injected was 4.76 per cent., while among the others it reached 16.45 per cent. He thinks that while no specific action upon the evolution of the pneumonia was shown, the use of the serum aided the organism to throw off the infection and seemed to prevent complications.

[While there seems to be little scientific reason in such a series of experiments from a therapeutic point of view, these observations serve to emphasize the fact, already noted by those who have had any experience in immunizing large numbers of children in hospitals, that the existence of another infectious disease seems to be no contraindication to the use of diphtheria antitoxin when its specific prophylactic or curative effects are desired. They also support the view of those who plead for an early use of antitoxin in cases in which the diagnosis is still in doubt.—ED.]

A Symptom of the Incubating Stage of Pertussis.—ILLOWAY (*Pediatrics*, January 15, 1899, p. 63) has carefully observed two cases of pertussis from their very earliest development, and is thereby led to believe that the period of incubation is a much more protracted one than ordinarily described; that it is not characterized by any febrile movement or evidence of catarrh, and that it would thus remain unrecognizable but for one phenomenon which it presents, and which, perhaps, more extended observations may demonstrate to a certainty to be pathognomonic.

In the first case, a robust girl, aged five years, a slight hacking cough was first noticed not more than four or five times a day, and then only after unusual exertion. The throat and larynx showed nothing abnormal. For two weeks the hack was noticed only in the daytime; then it occurred during the night. About three weeks after the hacking was first noticed the child began to complain of feeling tired, though she was lively and would run about the house, but would very soon become fatigued. At the end of the fourth week the character of the hack suddenly changed and the catarrhal symptoms appeared. The attack was exceedingly severe and prolonged.

In the second case, a girl, aged three years, in perfect health, the hack was present for two weeks, in about the same degree as in the first case. Two or three days later the catarrhal stage was fully developed. The disease here ran its course in a very mild form.

The author regards this hacking cough as a true pathognomonic phenomenon of the entrance into the body of the toxic agent of whooping-cough. He also thinks that the longer the period of incubation (*i. e.*, the greater the resistance of the system) the greater the infection, and the severer and more prolonged will be the sickness; while the shorter the incubation the milder the disease and the more brief the period of its duration.

If the value of the conclusions drawn from these two observations can be verified by the observations of others, the prospect of arresting the disease by the prompt application of bactericidal agents would seem more encouraging than such efforts in the past have proved to be.

Statistics of Revaccination.—SAINT-YVES MÉNARD (*Revue Mensuelle des Maladies de l'Enfance*, March, 1899, p. 144) gives a suggestive table compiled from various French sources to show the proportions of positive results obtained by revaccination at different ages. From six to ten years (Toledano), 17.6 per cent.; at ten years (school statistics), 15 to 18 per cent.; at twenty years (military statistics), 50 per cent.; from twenty to forty years (this and the following from the statistics of La Salpêtrière), 60 per cent.; from forty to sixty years, 74.2 per cent.; from sixty to eighty years, 82.9 per cent.; from eighty to one hundred years, 88.5 per cent.

These figures clearly show that vaccinal immunity gradually disappears with time; at the age of six years it has already ceased in one-sixth of the cases. The practice of revaccinating about the seventh year is thus shown to be founded on rational grounds.

The popular opinion that elderly persons have no need of being revaccinated is shown by these statistics to be a dangerous one. Revaccination after the age of sixty has been successful eight or nine times out of ten. It is therefore evident that revaccination is most important with the aged, then in turn with adults, young people, and finally children.

Alcoholic Pseudo-Meningitis.—AUSSET (*Société Centrale de Médecine du Nord*, February 24, 1899) reports the observation of a wet-nursed infant of two months, which presented symptoms very closely simulating meningitis. The temperature was 102.5°, the anterior fontanelle bulging; there was also stiffness of the neck and some diarrhœa. Headache was apparently present, for the child cried frequently and wrinkled the forehead. These symptoms appeared quite abruptly three days before the reporter was called. The diagnosis lay between meningitis, influenza (which was prevalent at the time) and a pseudo-meningitis. Intermittency of pulse, sighing respiration, and vomiting were later symptoms. At this time the child's nurse was obliged to leave, and it was learned from another domestic that she had been in the habit of becoming intoxicated every day. After the change to a new nurse the symptoms persisted for seven or eight days, and then gradually subsided. The author attributes the condition to acute alcoholism produced by the nurse's milk.

SURGERY.

UNDER THE CHARGE OF

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The Value of Erosion and Excision in the Treatment of Tubercular Disease of the Joints in Children.—MAYLARD (*The Elinburgh Medical Journal*, June, 1899) has made a careful résumé of the results which he has obtained in the past ten years in the treatment of tubercular joints in children by erosion and excision, eliminating from his observations all cases of recent date and using only those in which he was able to obtain the remote results by examination.

He found that in no case did erosion produce shortening of the limb due to interference with its growth. On the other hand, such shortening was frequent after excisions, with a retardation in development at a distance from the seat of operation. Thus, in excision of the elbow-joint there was generally more motion obtained and less tendency to ankylosis, but in contrast to the result from erosion the development of the limbs was retarded; the hands were small and weak, so that the patient, although having better motion at the elbow, had less strength in the hand, and consequently there was a less valuable utilitarian result. He, therefore, unhesitatingly recommends erosion in preference to excision in children, and believes the practice is the more imperative the younger the child.

Tuberculosis of the Knee and Its Relation to the Development of the Limb.—LEUSDEN (*Deut. Zeit. f. Chir.*, April, 1899) gives a résumé of thirty-four cases, the careful clinical study of which, with a study of the literature of this subject, led him to the following conclusions:

1. The most complete and valuable aid in determining the condition of any portion of the skeleton is a Röntgen-ray examination.

2. In chronic tuberculosis of the knee-joint occurring during the period of development, so long as it remains in the stage of fluorescence shortening of the femur on the affected side is rare, while lengthening is frequent.

3. If this increase in development is followed later by a shortening the diagnosis is doubtful; at least this is a rare occurrence.

4. The lengthening takes place in the shaft of the femur, and is chiefly due to increased development in the lower epiphysis of the femur.

5. The cause of this increased development is found in an increased developmental irritation acting from the diseased joint upon the epiphyseal cartilage.

Phlegmon Ligneux of the Neck.—A phlegmonous condition of the neck that so simulates malignant diseases as to make the differential diagnosis difficult has been described by Reclus. KUSNETZOFF (*Arch. f. klin. Chir.*, 1899, Band lviii. Heft 3) reports a case and reviews the literature of the subject. The phlegmon develops from the deep tissues of the anterior or lateral portion of the neck, and gradually spreads out in all directions The enlargement takes place without pain, marked fever, or any noticeable disturbance of the general system. It takes weeks or months before it softens or suppuration takes place. It is characterized by no typical symptoms, and there is no involvement of the skin. The swelling restricts motion, but heat and pain are not present. After a period of four, five, or six weeks œdema of the skin occurs. Small foci of suppuration are found distributed throughout the indurated mass, but their opening and evacuation do not result in a cure, except after a slow progress of disintegration.

The etiology of this phlegmon is unknown, and until its character and the source of infection that produce it are better understood treatment will be of little avail, and its true character can only be recognized by the course its development takes and its final benignity.

An Improvement in Cheiloplasty.—The results of this operation have been satisfactory in many respects. The contraction of the lip operated upon has been overcome by various methods for the formation of plastic flaps, yet there has in all these operations been a defect from the cosmetic stand-point. The red margin of the lip has been deficient in some operations, in others one lip has been made shorter than the other.

SILBERBERG (*Cent. f. Chir.*, May 27, 1899) overcomes these drawbacks by a slight modification of the incision. When the incision for either of the generally employed plastic operations reaches the outer margin of the lip at the angle of the mouth, he carries it along the outer border of the lip, opposite to the one in which the defect is, for a sufficient distance to permit it to replace the defect of the other lip. When the closure of the defect has been accomplished by the plastic operation the red margin of the lip is found to have been equalized on both lips, the freed portion of the sound lip having been brought around to form the mucous covering of the defective.

The Surgical Treatment of Ascites.—Experiments upon animals and cases recently reported, where the portal circulation has been established by forming a collateral circulation between the abdominal parietes and the mesentery, by producing adhesions between the peritoneal surfaces, have lately been brought forward by Weir.

TILMANN (*Deut. med. Woch.*, 1899, No. 18) reviews the literature of the subject, and points out the fact that in numerous instances of tubercular peritonitis not only the tubercular process but also the ascites was favorably influenced by a simple laparotomy.

When for any reason there is obstruction of the portal circulation a collateral circulation may be established (1) by the hemorrhoidal plexus; (2) by small veins that form between the small and large intestine and the vena cava inferior; (3) the veins in the ligamentum teres communicate with the portal vein and with the arterior-parietal peritoneum, forming the so-called "caput medusæ;" (4) the gastric veins communicate with the œsophageal.

This collateral circulation has, however, been frequently found inefficient. The author's experiments on dogs lead him to believe that in such cases a collateral circulation can be readily established by operative interference, the communication being established by producing adhesions between the parietal and visceral peritoneum. Where such a circulation has been established by a previous operation in dogs the animals will survive the ligation of the mesenteric and even of the portal vein itself. Where, however, such collateral circulation has not been established, the dogs perish if either one or both veins are ligated.

Although these operations do not permit the author to draw definite conclusions regarding the value of operative interference in this class of cases, he believes that they show that relief can be found by establishing a collateral circulation by these means.

Remarks on the Treatment of Club-foot, Based on Personal Experience of Three Hundred Cases.—McKenzie (*Canada Journal of Medicine and Surgery*, May, 1899) summarizes his views as to the possibility and results of treatment at different periods as follows:

1. The prognosis in ordinary non-paralytic club-foot is good.
2. In children the restoration of form should be perfect, and function should closely approximate the normal.
3. Restrictive methods, either by dressings or apparatus, should be as little employed as possible.
4. Persistent manipulation improves function and development.
5. Operative treatment must be thorough. No part of the correction of deformity should be left, hoping that mechanical means will complete the work.
6. Intelligent and long-continued after-treatment is essential to a final good result. Properly constructed boots should be worn, and the foot retained in the corrected position at night.
7. Age is no bar to successful treatment. Eminently satisfactory results may be obtained in adult life. Even in the case of adults the more heroic methods of operation in many cases are not called for.
8. The prognosis in paralytic cases will vary according to the nature and degree of paralysis.

The Removal of the Gasserian Ganglion.—Coelho (*Rev. de Chir.*, 1899, No. 5) reviews the literature of this subject, and comes to the following conclusion based upon the work of others and his own results reported in the cases in which he has been successful:

1. The ablation of the Gasserian ganglion should be the last resort in the treatment of trigeminal neuralgias, as it is a dangerous intervention on account of the liability to injury of the internal carotid. The injury of the cavernous sinus and of the middle meningeal, although not so dangerous, since their injury can be recovered from, weakens the individual and retards the operation. Cerebral compression, shock, and secondary infection are the causes that produce death.

2. The extirpation of the ganglion should be executed by tearing away the trigeminal at the protuberance, if recurrence is to be avoided, for thus only can we be certain that the entire ganglion has been removed; this cannot be assured in isolated removal of the ganglion.

Psychical Disturbances after Operation.—MARANDON DE MONTYEL (*Rev. de Chir.*, 1899, No. 5) divides this subject into two groups, composed of those cases in which the psychic phenomena are acute and transient and in the other they are permanent—that is, there are toxic delirium and permanent lunacy.

The former or acute may follow any operation as may deliriums that follow poisonings from any drug or septic conditions. Previous intoxication has no effect, nor do habit or occupation or the results of previous disease produce a predisposition. On the other hand, manias require for their production a predisposition.

The varieties of post-operatory psychic disturbance are very numerous. The delirium, however, has its characteristics for each particular form of poisoning, while the manias vary in degree in proportion to the predisposition.

Operations upon the thyroid have an especial influence upon the intelligence. All others have relatively an identical influence from the post-operative stand-point. Gynecological operations, and especially those upon the ovary, are wrongly judged to have peculiar psychic effects.

With our present knowledge it is possible to explain the post-operative delirium, as it is toxic in its origin, but it is impossible to explain the mania which occurs at this time.

A Case of Renal Sarcoma Successfully Removed by Lumbar Nephrectomy.—JONES (*The Edinburgh Medical Journal*, June, 1899) reports the following case, which, in the light of recent research on this subject, is very interesting.

It has recently been shown that these malignant growths differ in their structure and by the clinical histories; that in a considerable number of cases nephrectomy has been successful not only as regards the operation, but also that it has prevented the recurrence and spread of the disease. These growths certainly differ in their "malignancy," and there can be no doubt that our knowledge will be more definite and precise if we look for guidance in our treatment to a careful study of clinical histories and the microscopical structure of the growths removed.

The case presented the following symptoms: A previous attack, eight years ago, of "inflammation of the kidneys," which lasted two weeks. No family history of malignant disease. Eight months ago the patient twisted himself while carrying a plank. This led to hæmaturia, blood continuing to be present in the urine several days. For the past three months there had been considerable lumbar pain, at first dull aching, unassociated with sickness, and not continuous. Later it became more severe and practically permanent, and blood made its appearance in the urine in the form of long, thin clots of blood, looking as if they had been moulded in the ureter.

The patient was robust and healthy-looking. Urine neutral, 1012, and contained blood and albumin. Examination under an anæsthetic revealed an enlargement of the left kidney, with a distinct nodular mass in the lower part. The lumbar operation showed the kidney to be the seat of a distinct growth, which was localized. Nephrectomy was performed, and the patient recovered completely.

The microscopical examination showed the tumor to consist of embryonic connective tissue cells, separated and surrounded by newly-formed fibrous tissue-like elements. The cells varied somewhat in size and form. Many were round or slightly oval, and stained deeply with hæmatin. Others were elongated and distinctly spindle-shaped. In some parts the cells were aggregated in dense masses, while in other areas they were separated by strands of fine, embryonic connective tissue, which formed a delicate stroma in which the cells appeared in somewhat alveolated form. In extensive areas the supporting tissue had undergone myxomatous change, and in some parts the cells seemed to be participating. These areas presented a curious honeycomb-like appearance, with the cells lying in many instances quite free in the spaces. The greater part of the growth stained readily. The vessels appeared as mere spaces lying in the tumor, with no distinct walls. The tumor was in parts very vascular, as was the tissue surrounding it.

The Surgical Treatment of Tuberculosis of the Lung.—TURBAN-DAVOS (*Berlin. klin. Woch.*, 1899, No. 21) compares the treatment of tuberculosis of the lung to the treatment of tubercular foci in any position. The result of serous effusions and empyemata has demonstrated the tendency of the abscess cavity in the lung to undergo the same spontaneous healing that occurs in other tubercular abscesses when the collapse of their walls is permitted by the surrounding structures. This has been previously attempted by thoracotomy, but the impossibility of preventing a subsequent infection of the pleural cavity has militated against its employment. The author proposes as a substitution a thoroplasty, which permits the thoracic wall to yield and the lung within it to collapse and close the cavity within. He resects a portion of each rib in the midaxillary line, taking care that the pleura is not injured and that the periosteum is removed so that no new bone can be formed.

This operation he would especially recommend in cases where the thoracic wall is rigid and the lung has been the seat of marked tubercular disease. He has seen it afford marked relief.

The Development and Nature of Tumors of the Salivary Glands.—HINSBERG (*Deut. Zeit. f. Chir.*, 1899, Band li. Hefte 3 u. 4) summarizes the results of a careful clinical, microscopical, and pathological study of the various tumors that occur in these glands, as follows:

1. The encapsulated tumors of the salivary gland, and probably those which involve them from other portions of the cranium, consist of epithelial elements and a stroma that is of the nature of bone cartilage.

2. They are benign when they present an organic arrangement, as, for instance, the epithelium and connective tissue of a gland. They are malignant when this order is altered, and we find the epithelium, either from trauma or by operation, in a wrong relation to the surrounding tissues, as in the connective tissue of the parotid gland. It develops, then, without the early characteristic stroma. The latter is also wanting when the tumor is malignant; this the author has confirmed in a series of cases.

3. Both components of the tumor—the epithelium and the stroma—develop from embryonal tissue in the Cohnheim sense. In the embryo the condition for a common development are present, as the parotid as well as the submaxillary gland, before they are encapsulated lie with individual acini close and firm in the periosteum of the inferior maxilla—*i. e.*, in the perichondrium of the Reichert's cartilage. The cylindrical epithelium comes undoubtedly from the gland itself, perhaps also the pavement epithelium, perhaps from the elongated layer of cells.

4. The undoubted evidence which confirms the author in the opinion that the tumors develop from the endothelium of the lymph-spaces and ducts are the following:

He does not believe, with Volkmann, that these tumors commence in the endothelium or that the origin of the tumor can be found microscopically in the tumor itself.

He believes that the tissues present in various stroma, especially the cartilaginous, osseous, and hyaline, are not the result of a metaplasia, but that they result from special conditions.

5. He holds that the theory that they are the result of a combination of epithelium with osteochondromatous tissues from outside is justified by the facts that the nature of the epithelial cells has been shown to justify such a belief. The arrangement is epithelial in its exquisite delicacy, and the arrangement of the cells complex. The fact that sometimes there is no direct connection with the epithelium of the gland is not against this theory. Such connection is not to be expected since it is developed from embryonal tissue. The presence of osseous and cartilaginous cells admits of no other explanation, while the conditions for such development are present in the embryo.

Successful Extirpation of a Cancer of the Œsophagus.—It is seldom that primary cancer of the œsophagus involves a portion of that tract that is amenable to treatment by surgical intervention. QUERVAIN (*Correspondenzblatt f. schw. Aerzte*, April 1, 1899) reports a case in which the œsophagus was involved for a considerable distance, but where uninvolved tissue was found above the arch of the aorta. The author was able to enucleate the tumor completely and to resect the œsophagus through healthy tissue at the level of the arch of the aorta. It was, however, impossible to insert sutures or to tie ligatures. The end of the œsophagus was allowed to slip down into the mediastinum and the wound was packed with gauze The wound above was closed so far as was possible, and both healed rapidly. A salivary fistula, however, persisted unhealed from the mouth out upon the side of the neck, but the discharge was readily absorbed by three pads a day. The patient recovered completely, and continued to be well nourished by the gastric fistula, which had been established before the other operation was undertaken.

This operation is indicated where the stricture is high up, at 15 to 18 cm. from the incisors. This case also points to the fact that where an early diagnosis is made in such a case the operation is able to afford great relief and possible cure.

Inoperable Angiosarcoma Cured by Electrolysis.—VIDEBECH (*Cent. f. Chir.*, 1898, No. 31) reports a case of angiosarcoma occurring in a girl of sixteen years. It was the size of a child's head; was situated at the base of the neck posteriorly, and had rapidly increased in size during the last two months.

The attempt was made to remove it, as it was not adherent to the skin and had considerable freedom of motion. The operation, however, showed that it had invaded the deeper structures and had passed anteriorly between the lateral spines of the vertebræ, where it was impossible to reach. After as much as was possible had been removed, the wound was cauterized with chloride of zinc and an aseptic dressing applied. The microscopical examination of the tumor showed it to be an angiosarcoma. On the removal of the dressing on the fifth day there was considerable hemorrhage. The wound was packed with iodoform gauze, and the next day electrolysis was commenced. Four needles were passed from the positive and negative poles as deeply into the remaining tumor as was deemed safe, in different directions, and a current of 500 milliampères was passed. This was followed by a copious discharge of necrotic tissue sometimes as large as an egg. The wound finally cleared up and granulated over.

About a month later the granulations assumed an unhealthy appearance and a microscopical examination showed sarcomatous cells. The electrolysis was, therefore, repeated on four successive days. The current was several hundred milliampères, and the chemical action about the nedles was marked. The wound healed rapidly after this by granulation, and the patient was shortly dismissed, about six weeks after the original operation.

The patient was under observation for over three years, and no recurrence had been noted.

A careful review of the literature of the subject shows that no results similar to this have been obtained where the nature of the tumor has been determined by microscopical examination, and an operation has demonstrated the impossibility of removing it in its entirety.

The author agrees with Kaarsberg, that the rational method of operating by electrolysis consists (1) in using it as an adjunct to the knife where that cannot be employed; (2) in the employment of strong currents of electricity, which produce a decided, quick, and thorough destruction of the diseased tissues. To make this possible the tissues must be freely accessible, so that one can see where to work and avoid injuring vital parts, and also to provide an outlet for the devitalized tissues.

Powerful currents are not as dangerous as has been supposed. The needles should be thrust deeply in at various points, and should be employed on both poles.

The Employment of the Soluble Silver Salts of Metallic Silver in the Treatment of Septic Wound Infection.—WELTER (*Deutsch. med. Woch.*, 1898, No. 40) reports an interesting series of cases of general infection in which he has secured remarkable results by the employment of Credé's ointment. He summarizes his views as follows:

1. In soluble metallic silver we have a useful agent, which, when a correct early diagnosis is made, before severe secondary infection has taken place, is capable of influencing favorably blood-poisoning due to the absorption of septic infection.
2. Both acute and chronic sepsis and furunculosis are amenable to the general silver treatment.
3. The greatest energy is developed by the employment of inunctions of the unguentum Credé. Through this means a general systemic effect is produced by the rapid absorption into the blood of this agent, and thus a general antisepsis and disinfection of the entire organism is produced.

The Resection of the Cervical Sympathetic in the Treatment of Epilepsy, Etc.—JONNESCO (*Centralbl. für. Chir.*, February 11, 1899, No. 6) has performed this operation in forty-five cases. In forty-two cases the total bilateral resection was the method employed; in one cases total resection on one side and the extirpation of both superior cervical ganglia on the other side; in seven cases unilateral total extirpation and in one the bilateral removal of both superior cervical ganglia. Six cases died from epileptic seizures or some intercurrent disease. Of the thirty-nine remaining cases nineteen have remained under observation for a considerable length of time. Ten are cured; they have had no seizures for two years; five cases, for nineteen months; one case, from fifteen to eighteen months; three cases, for six months. Six other cases are markedly improved; two were not helped. The percentages are 55 per cent. cured; 28 per cent. improved; 15 per cent. without benefit.

One of his cases that also had chorea has had no attack for the past two years. The author believes that the operation should not be undertaken in all epileptics where mania and epileptic dementia are present, as the operation cannot promise certain results, since marked changes have taken place in the cortex of the brain. In cases of early epilepsy, with or without mania, the operation can produce brilliant results, as well from the crises as from the deeper changes in the cortical area, which considerably improves.

A closer study and knowledge of the causes of the epilepsy will make clearer the kind of cases which will derive most benefit from this operation. In reflex gastro-intestinal epilepsy it acts by the removal of the sympathetic fibres preventing the reflex stimulation. In the anæmic or toxic forms the resection of the sympathetics modifies the nerve-cell nutrition by altering the blood-supply or preventing the ingress of toxic products.

THERAPEUTICS.

UNDER THE CHARGE OF

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Suprarenal Gland Extract as a Hæmostatic.—M. LERMITH writes that a watery extract of suprarenal gland applied just before cocaine in ophthalmic practice greatly adds to the anæsthesia produced by the latter. Marked vasoconstriction of cutaneous and even subcutaneous vessels rapidly follows its exhibition. Conjunctival hyperæmia from any cause may be thus relieved. Eczema of the skin, nævi, and even sarcomata are also affected favorably. The extract is serviceable in nasal surgery, adding to the cocaine anæsthesia and preventing primary and secondary hemorrhage. The writer treated a patient suffering with recurrent epistaxis as follows: A solution of cocaine hydrochlorate, 5, distilled water, 95, was introduced into the nasal cavities on cotton, and withdrawn after five minutes. Then sponges saturated with a solution containing boric acid, 3; dried extract of suprarenal gland, 1, and distilled water, 96, were inserted and allowed to remain for the same length of time. These applications were first made on alternate days, and later twice a week. The immediate effect on the nasal mucous membrane was to produce ischæmia and entire cessation of the hemorrhages. For twenty months there has been no recurrence of what was previous to treatment a very frequent epistaxis. Following the application there was no oozing of blood, and the scar healed perfectly in six days. Treatment was continued for three months, and there were twenty-four applications in all.—*British Medical Journal*, 1899, No. 1991, p. 467.

Addison's Disease.—DR. A. SEIBERT reports two instances of the use of suprarenal extract. In the first there was a gain of about twenty pounds in weight, the pigmentation almost completely disappeared. The dose was five grains thrice daily; later, six times daily, or ten grains thrice daily. In the second articular rheumatism was severe, for which salicylic acid was administered by the rectum. Success followed the administration of five grains of the extract thrice daily.—*New Yorker Medicinische Monatschrift*, 1899, No. 3, S. 138.

To Prepare Solutions of Suprarenal Gland.—DR. M. D. LEDERMAN finds that formalin, carbolic acid, corrosive sublimate, and boric acid inhibit the marked vasoconstricting action of the gland. To prepare a serviceable solution ten grains of the gland are added to a drachm of a 25 per cent. solution of glycerin in water. This is placed in a wide-mouthed bottle and well shaken. After standing in a room at ordinary temperature for two days, with occasional shakings, it is filtered into a clean bottle. Thus made it will remain clear for some time, if kept cool. Glycerin seems to be sufficiently antiseptic, and this solution is not too viscid for spraying. The method of use is by cotton application both before and immediately after the use of cocaine. No constitutional symptoms will be produced by cocaine under these condition.—*The Laryngoscope*, 1899, No. 4, p. 217.

[It should be noted that the previous application of suprarenal extract to an inflamed mucous membrane will render cocaine effective in producing anæsthesia when this would otherwise be difficult or impossible.—R. W. W.]

Antistreptococcic Serum.—Dr. William L. Robinson reports upon the use of this remedy in the treatment of puerperal septicæmia, septic cellulitis, post-operative sepsis, and erysipelas. In this report the amount injected was usually two and one-half drachms, repeated if necessary. The success obtained in sixteen patients is an argument for early and free use of this method.—*The Virginia Medical Semi-monthly*, 1899, No. 23, p. 687.

Treatment of Ozæna.—Dr. P. McBride presents his experience with cupric electrolysis, the histories of eight patients being briefly presented. The strength of the current varied from 3 to 10 milliampères, rarely exceeding the latter. Cocaine was used in most, if not all, and after cleansing the nostrils the copper needle attached to the positive pole was inserted into the inferior or middle turbinated body, sometimes into the tissues lining the middle meatus, while the platinum or steel needle was passed into the septum. Usually the patients complained of little pain, nor did they experience disagreeable after-effects. As a rule, each sitting lasted about ten minutes. Of the eight patients, four were practically cured for long periods, extending to eighteen months. In one there was marked improvement; in one apparent cure for some months, but the syringing had to be resumed, while in two there was only improvement for a few weeks. The term "cure" refers only to the fetor, for in most of the patients the atrophy remained as before.—*The Edinburgh Medical Journal*, 1899, No. 3, p. 217.

Credé's Silver Salts.—Dr. Schill presents an excellent summary of the extant literature. The disadvantages of actol [silver lactate] are that it forms masses, and for that reason is dusted upon surfaces with difficulty; that it is sensitive to the action of light, and that it irritates nasal and laryngeal mucous membranes. Itrol [silver citrate] may be employed as a powder upon wounds, granulations or mucous membrane, or as a 1 or 2 per cent. ointment of lard, vaseline, or lanolin, or as aqueous solution, 1 to 4000 or 5000, for the disinfection of hands, instruments or the skin, and for irrigation of cavities. As 1 to 5000 or 10,000 it may be employed as a gargle or for moist dressings. Its disadvantages are the staining of linen, slow deodorizing properties, the cloudiness produced in ordinary (not distilled) water from the formation of silver chloride, whereby a portion of the silver is rendered inert, slow disinfection in advanced disease, and darkening on exposure to light. Colloid or soluble silver was first made nearly two years ago. This may be employed, even hypodermatically, as a 1 per cent. aqueous solution, preserved in dark glass bottles. Made up as an ointment with lard and wax, with benzoated ether to improve the odor, when rubbed into the skin about two-thirds is absorbed. The third method of administration is as a pill containing one-sixth of a grain, with sugar of milk and glycerin as excipient, of which two may be taken twice or thrice daily, followed by three to six ounces of boiled water or tea. The importance of these remedies in various infectious diseases is evident, and the success attending their use is well established by a long series of favorable reports. Quite recently Dieckerhoff reported the successful use of colloid silver ointment in the purpura hemorrhagica of horses (four cases). In three he gave intravenous injections (jugular vein) of an ounce and a half of a 1 per cent. solution of colloid silver. Another received five such injections within two hours.—*Therapeutische Monatshefte*, 1899, Heft. iii. S. 162.

[The decidedly unsatisfactroy therapeusis of purpura hemorrhagica in man suggests a trial of colloid silver hypodermatically.—R. W. W.]

Sodium Tetra-iodo-phenolphtaleinate.—DR. JOHN S. PEREKHAN reports upon the results which he obtained in more than one hundred instances of the use of this remedy, which is commercially known as nosophen. It is obtained by the action of iodine upon phenolphtalein and occurs as a light and impalpable, yellowish-gray, odorless, tasteless powder containing over 60 per cent. of iodine. It may be heated to sterilization without decomposition, is insoluble in water and acids, with difficulty in alcohol, and readily in alkalies. It is generally used as a dusting powder, but may be mixed with colloidin, or employed as an emulsion, or gauze may be impregnated with it. Its siccation and hæmostatic properties are marked. It should not be used too freely, else a firm crust may be formed, which interferes with drainage. Since it is not irritating, non-poisonous, and has no odor, it is superior to iodoform. It is sedative, diminishes suppuration, and promotes healthy granulations.—*Chicago Medical Recorder*, 1899, No. 3, p. 222.

Phenocoll Hydrochlorate.—DOTT. SALVATORE SATULLO remarks that although much stress is laid upon the antipyretic and analgesic properties of this drug, he has found it valuable in the treatment of malaria and rheumatism. For the former he regards it as almost a specific, a true substitute for quinine, and particularly to be used in case of idiosyncrasy or gastric disturbances. In pregnancy when quinine is contraindicated, this is an important remedy. The dose is from twenty to thirty grains daily, preferably before the febrile attacks. In rheumatism its effects are noteworthy, whether the disease is acute or chronic, and it is always to be preferred to the salicylates when cardiac weakness exists or threatens. The daily amount is one drachm. —*Gazetta degli Ospedali e delle Cliniche*, 1899, No. 13, p. 132.

On Morphinism.—DR. RABINOVITCH believes that in a large majority of habitual morphine maniacs there is a hereditary degeneracy. They often come from highly neurotic or neuropathic families deficient in will-power and mental poise. The normal mental equilibrium is lacking to start with, and there is added a drug-habit—morphine, or some other. She believes this view to be sustained by the fact that frequently these patients are highly intelligent and educated. Every effort is made, with the enfeebled will-power they possess, to conquer their inclinations, but without effect. The writer believes the victim of morphine is in a condition more closely akin to insanity than is generally thought. Localization of the cerebral lesion, if there be any lesion, is not possible. The writer suggests an exaggerated appetite, lessened will-power or solutions of continuity in association fibres which maintain the "psychic harmony." Though vague in her explanation, she believes there is a definite material cerebral defect. Patients with these underlying fundamental deficiencies of brain-power are capable of great improvement under supervision; but the hereditary influence being marked and the unknown anatomical lesion (?) pronounced, mental instability is too great to expect permanent recovery.—*New York Medical Journal*, 1899, vol. lxix., No. 9, p. 302.

Dionin.—DR. J. KORTE gives the clinical name of this substance as ethyl-morphine hydrochloride, and its formula $C_{19}H_{22}NO_3HCl + H_2O$. It occurs as colorless crystalline powder, of markedly bitter taste, and readily soluble in water and alcohol. Twelve patients suffering from pulmonary tuberculosis received this remedy in half-grain doses at bedtime. The pharyngeal irritation was relieved, and restful sleep followed without night-sweating or other unpleasant symptoms. In some instances one-sixth of a grain seemed sufficient. Other symptoms, as cough, chest pains, and muscular soreness, were also benefited. Six patients suffered from chronic bronchitis and pulmonary emphysema. In general, the asthmatic attacks were relieved, the dyspnœa improved, and the cough and pains were benefited. As an analgesic and hypnotic eight observations are recorded. The conditions were various—hypostatic pneumonia, polyarticular rheumatism, inoperable uterine carcinoma, gastric and hepatic carcinoma (two instances), chronic parametritis, panaritium, and chronic gastric ulcer. In these the analgesic properties seemed established, and insomnia, so far as it was caused by pain, was benefited. Its field of use includes the irritation-cough of early pulmonary tuberculosis, that of chronic bronchitis, emphysema, and so-called bronchial asthma. As an analgesic it is not so trustworthy as morphine. It may be administered dissolved in distilled water or syrup, and made into pills with proper excipient.—*Therapeutische Monatshefte*, 1899, Heft 1, S. 33.

Aneson as a Substitute for Cocaine.—DR. MASBACHEN presents his reasons for prefering this substance in the infiltration anæsthesia of Schleich and the regional anæsthesia of Oberst. This is the watery solution of trichlorpseudobutyl alcohol, or acetone chloroform, which in the past has not been utilized because of its insolubility in water. This difficulty has been overcome, and 1 or 2 per cent. solutions equal in anæsthetic power about 2 per cent. solutions of cocaine. The preparation is kept in wide-mouthed vials, each holding about two drachms, into which the hypodermatic syringe may be readily introduced. The solution is permanent. The advantages are: 1. The original preparations are used without dilution to various strengths, and the remedy acts even in severely inflamed tissues. 2. In point of harmlessness it is superior to all hitherto known remedies for local anæsthesia. 3. The secondary pains of infiltration anæsthesia are not observed when this remedy has been employed. 4. It is equally useful when employed according to the method of either Schleich or Oberst.—*Münchener medicinische Wochenschrift*, 1899, No. 3, S. 81.

Cosaprin.—Dr. Anton Schudmak reports upon the use of this substance, which is a sulpho-derivative of acetanilid, as an antipyretic and antirheumatic in the diseases of children. Laboratory experiments show that it is without influence upon micro-organisms, nor does it injure the blood, for 10 per cent. solution does not destroy the amœboid movements of the white corpuscles nor change in any respect the red. Since it is very soluble in water it may be administered in sweetened water as a 2 or 3 per cent. solution, of which the dose is a small spoonful every hour; or it may be given as a powder in four to eight-grain doses thrice daily, its somewhat salty taste not being objectionable. In the sixty instances of its use no untoward symptoms supervened. If rapid action is desired it may be administered subcutaneously, which is impracticable with two of the most important antirheumatic remedies—salicylic acid and sodium salicylate. The remedy has no marked effect upon either respiration or circulation, nor does it produce exanthemata. As an antipyretic the lowering of temperature is not lasting, in that the previous high temperature is again reached in two or three hours.—*Klinisch-Therapeutische Wochenschrift*, 1899, No. 2, S. 39.

Morphinomania.—Prof. Debove states that at first there is a short period of exaltation; following this the reverse occurs, and the victim is in the depths of despair, suffering much. Another dose of morphine is desired, which produces only a negative pleasure—a cessation of the craving for relief. Accidents often occur. If a vein is entered when the hypodermatic needle is inserted, vertigo immediately follows, and a condition closely simulating drunkenness, and this fact is often turned to account by the users of the drug. Carelessness in cleansing the syringe results in septic injections, producing abscesses and erysipelas. As the patient's resistant power is weakened, death not infrequently results. Primary injections of morphine are very disagreeable, being often followed by nausea and vomiting. Then exaltation is paramount. This period may last weeks or months. Sooner or later no result is obtained from injections except cessation of desire for the drug. Effects of morphinism are discussed *seriatim.* The muscular system is weakened, both striated and non-striated muscles being involved. Thus the obstinate constipation and dysuria are caused. A fine tremor like that of alcohol-poisoning is often present. General sensation is affected, pruritus and neuralgias are of frequent occurrence. Vision, smell, and hearing are enfeebled. The pupils are regularly contracted, accompanied anorexia and dry tongue, great thirst. Absence of hydrochloric acid in the gastric juice, diminished secretion of the intestinal glands and of bile, together with clay-colored dejections, force the symptom-complex in the gastro-intestinal tract. Nutrition fails, loss of flesh follows, and œdema of moderate degree is seen about the ankles. The skin becomes rough, the sweat-glands increase their activity (that of the sebaceous glands is diminished), and various eruptions, abscesses, and furuncles are frequent. The urine is unaltered. Albuminuria and glycosuria are probably not caused by morphinism. If the drug is present in the urine it is in very small amounts. Sexual desire is destroyed and impotence follows. Temporary sexual excitement may follow an injection of morphine. Amenorrhœa is common. Children born of mothers with morphine habit show in their first days an unusual depression and collapse.

If opium in some form is not exhibited death may follow. Later the drug may be slowly withdrawn. Psychical changes are common. Patients become silent, morose; memory is impaired, volition is diminished. They are famous liars, and sense of right and honor are lost. Hallucinations occur, and even paranoia. When morphine is withheld there follows an increase in nasal and bronchial secretions; the voice is hoarse; there is mydriasis. Headache and neuralgia are severe. Emesis, hyperacidity, colic, and diarrhœa soon appear. A grave collapse may follow, in which hypodermatic injection is indicated. Cachexia is the last stage, with premature old age. Complications of morphinism are: Hysteria, most often present during primary abstinence. Insanity rarely occurs as a resulting condition unless there is some predisposition. Alcohol, opium, cocaine, chloral, and ether are often tried as substitutes for morphine, with the result that a second drug habit is grafted on the first. Prognosis in morphinism *quoad vitam* is unfavorable, because mental depression is so marked, leading to recklessness, and because of the great difficulty in effecting a cure. Prophylactic treatment consists in wise abstention from its use, except where absolutely necessary. Pharmacists should accept only recent prescriptions. Curative treatment consists in winning the confidence of the patient and slowly diminishing the dose taken. When the habit is very marked, asylum treatment is the only rational method. For these patients complete, sudden withdrawal of the drug is not advocated, because of the intense suffering entailed, but diminution by half each day is recommended. Relapse must be guarded against. Alcohol, antipyrin, opium may be of temporary service to lessen the cravings of the patient during the first days. Lavage is useful, but the author prefers alkalies or chalk carbonate to counteract the hyperacidity of gastric juice which is present.—*La Presse Medicale*, 1899, No. 9, p. 49.

Orexin in the Vomiting of Pregnancy.—DR. F. HERMANNI reports nine instances of the use of this remedy in five-grain doses after each meal. Not only was the vomiting speedily relieved, but the nausea ceased and the appetite returned. Frequently but a few days' treatment was necessary to effect a permanent cure. No unpleasant symptoms were occasioned by the remedy. —*Therapeutische Monatshefte*, 1899, Heft 1, S. 24.

Urotropin in Cystitis.—DR. O. HEUBNER writes of the use of urotropin in pedriatic practice, reporting five cases. Of these four patients suffered from cystitis, voiding urine of ammoniacal reaction. In these improvement rapidly followed the establishment of an acid reaction. In the fifth, suffering from ulcerative urethritis and cystitis, with pyelonephritis and renal degeneration, the urine remained acid. The remedy had no effect upon the amount of pus voided in the urine. Continued use of the remedy does not produce any untoward result upon either the digestive or nervous systems. —*Die Therapie der Gegenwart*, 1899, 2te Heft, S. 63.

The Morphine Habit and Its Cure.—DR. DAVID PAULSON describes a method of treating morphinism. The patient is at once told what is to be done for him. No deceit of any kind is practised. Distilled-water hypodermatic injections, with the statement that they are morphine solutions, are not given. Patients are put to bed, each one having an attendant solely for himself. Warm electric baths—how prepared the author does not state—are given, with the usual result that irritation of the peripheral and central nerves is much lessened, and the patient falls asleep while still in the bath. This is continued for half an hour; the patient is then placed on a bed and gentle heat is applied to the spine. Next galvanism is practised, the positive pole to the spine. In cases in which the head is hot and flushed, ice-compresses are indicated. The purpose of this part of the treatment is to allay nerve irritation and distract the patient's mind. While the drug is being withdrawn the patient is kept on a fluid diet, largely of fruit-juices. Koumyss and buttermilk are freely given. The patient is encouraged to eat at three to four-hour intervals. Nausea and vomiting are combated by omitting the feedings, and rectal enemata are substituted. Beef-tea and flesh-foods are prohibited, as they are too great nerve stimulants(?) and increase the desire for the drug. When severe diarrhœa is expected or has occurred, bismuth and fluid extract of coto are given every two hours; the result is usually satisfactory.

The necessity for exhibiting morphine is wholly done away with, as a rule. Indications for giving morphine are: If suffering is great on the second day a small dose (amount not specified) is given. Rarely a second is needed. The crisis is passed under thirty hours. Other drugs are not to be substituted for morphine, as some equally pernicious habit may result. Tobacco must be stopped, since statistics show that when it is not used the percentage of relapses is much smaller. Insomnia is not to be treated by hypnotics, for another habit may follow; in their stead the patient receives a "neutral bath" at 93° F. before retiring. A moist, cold, abdominal bandage is applied. Relaxation of abdominal vessels and lessened cerebral congestion follows. Later graded gymnastics and outdoor exercise are carried out. Very few relapses have occurred.—*Modern Medicine and Bacteriological Review,* 1898, vol. vii. p. 254.

On Chloralamid.—DR. W. KRAMM writes that chloratum foramidatum or chloralamid is most closely related to chloral hydrate in its constitution and action. Chloralamid decomposes in aqueous solutions above 140° F. and in alkaline media, but it may be given in slightly acidulated liquids. In powder or in milk the drug dissolves so slowly that sleep does not result until the following day. Settow has had much success with enemata made as follows: Chloralamid, 45 grains; diluted hydrochloric acid, 7 minims; alcohol, 18 minims; distilled water, 3½ ounces. Dosage of chloralamid varies between 15 and 60 grains. The maximum for twenty-four hours is 120 grains. Sleep follows its exhibition more slowly than in the case of chloral, thirty minutes to an hour being the rule. Duration of sleep is on an average six hours for the full effect. Indication for its use is a large variety of acute and chronic conditions where a mild, certain, and safe hypnotic is required. Chloralamid changes the blood-pressure very little, it is free from bad effect on the heart, and in many cases of cardiac diseases it can be safely used. As a sedative and hypnotic it is valuable in insanity; objections to its use are that as after-effects there is sometimes headache lasting one-half to one hour, and rarely stupor may supervene. The writer concludes by saying that all authors state chloralamid is well borne by the stomach and does not impair appetite or digestion.—*Notes on New Remedies*, 1898, vol. x. p. 22.

The Etiology and Treatment of Laryngeal Tuberculosis.—DR. P. S. DONELLAN recommends the following for control of cough in the above condition: Codein sulphate, 3 grains; sodium bromide, 120 grains; syrup of wild cherry, 4 drachms; water to 2 ounces. Of this the dose is one drachm every four hours. Dysphagia is relieved by cocaine applications (4 per cent. solution), either as spray or with a laryngeal brush. Wolfenden's method of feeding is recommended: The Trendelenburg position while sucking liquid food through a tube. Rectal feeding may be temporarily indicated to give rest to the larynx. Krause's method of local treatment for ulceration is thus outlined: Cleanse the larynx with Dobell's solution; follow this with a 4 per cent. cocaine spray, and then thoroughly rub the surface of the ulcer with a solution of lactic acid. This is to be done every three or four days. Solutions will vary, according to circumstances, from 20 to 80 per cent. A cotton applicator is to be used. Often the ulcers heal completely. Curetting of the ulcerous surface before applying the acid is sometimes practised (Herying); but there is danger of producing still further secondary infection through the increased raw surface. Minim doses of pure guaiacol have been injected beneath the mucous membrane into the tubercular areas preceding ulceration, a special syringe being used (Donellan). The advisability of performing tracheotomy must be decided for each case on its own merits.—*The Therapeutic Gazette*, 1898, vol. xxii. p. 724.

The Treatment of Consumption and Lupus by Tuberculin.—DR. G. A. HERON began to use the new tuberculin (TR.) in March of last year. Ten patients were under observation; but one of these suffered from lupus. He has never seen harm done by the use of this remedy. It has done good in the treatment of lupus, and it is of value in helping consumptives on the way to recovery, provided the disease is in a very early stage. In advanced stages of the disease the discomfort inseparable from the use of the hypodermatic syringe is sufficiently outweighed by the slight chance there is of possible good that might come from the use of tuberculin. Of cure it is impossible as yet to speak, for there may be relapse in any one of the patients who now present a promising outlook. At present the new tuberculin is of more use than any other drug in the curative treatment of very early stages of tuberculosis affecting the lungs or skin.—*British Medical Journal*, 1898, No. 1958, p. 77.

The Antipneumonic Serum of Paul.—DOTT. R. MARSALONGO and C. FRANCHINI present the history of the production of this serum and the results of its administration in ten instances. Three deaths were recorded, all being alcoholic subjects, showing evidences of chronic nephritis. Its use seems to be free from general or local disturbance. It is antipyretic, solely because it arrests or modifies the disease, acting directly upon the local infection, and favors resolution. Its use is recommended in the severest cases—those complicated by degenerated arteries, chronic nephritis, chronic cardiac diseases, alcoholics, old age—giving better results than any other method.—*La Riforma Medica*, 1898, No. 31, p. 364.

OBSTETRICS.

UNDER THE CHARGE OF

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The Choice of Incision and Suture in Cæsarean Section.—In the *Archiv für Gynäkologie*, 1899, Band lvi. Heft 3, SIPPEL reports two interesting cases of Cæsarean operation, and discusses the best method of making the incision and the best suture material.

He draws attention to the fact that silk sutures act as drainage-tubes by capillary attraction, and that a silk suture passed through the wall of the womb into the uterine cavity may furnish a means of communication between the interior of the uterus and the peritoneal cavity. In healthy patients the womb is sterile and aseptic at labor; but should this not be the case infection might pass from the uterus to the peritoneal cavity by means of stitches. As an illustration of this he describes an interesting case, as follows:

The patient was a healthy woman in her fifth pregnancy, whose labor was made impossible by a solid ovarian tumor. Cæsarean section, followed by the removal of the tumor, was very readily performed. Foul lochial discharge was present on the third and fourth days, and above the symphysis there was a painful area. Here an exudate developed between the uterus and the wall of the abdomen. During a fit of coughing this exudate burst into the abdomen, and forty-eight hours later the patient died of peritonitis.

Upon autopsy it was found that on one side of the womb, where the silk stitches had proceeded from within outward, septic material had passed along the stitches to the peritoneum. The interior of the womb was septic, but not to a serious extent. Under ordinary circumstances the patient should have recovered readily from the condition present.

It is easy to understand how a mild degree of sepsis may readily arise during prolonged labor. The membranes may protrude and come in contact with the external genitalia, which may not be thoroughly clean. The head of the child may advance and recede, and also furnish a channel for contagion. Repeated examinations would increase the danger.

For this reason Sippel operated upon his second case by an incision upon the posterior wall of the uterus. He closed the uterine wall with catgut at the decidua and buried silk in the muscular tissue, and closed the peritoneal covering of the womb. His patient made a good recovery.

Sippel also draws attention to the difficulty experienced in closing the uterine wall when the placenta is directly under the line of incision. The placental site in the uterus is not tissue favorable for suture, and good union is difficult to obtain. He would, if possible, locate the situation of the placenta before opening the uterus, and so plan his incision as to avoid the placental site. He draws attention to the analogy between suture of the womb and suture of the intestine, and believes that in the case of the uterus catgut is better, because of its freedom from capillarity. He does not favor the transverse incision of Fritsch, but distinctly adheres to the longitudinal incision.

[We have, on one occasion, had suppuration occur in the wall of the uterus after Cæsarean operation. We were obliged to close the womb through the placental site. The peritoneum was stitched over the silk sutures with catgut, and the womb became adherent to the anterior peritoneal lining of the abdomen. Some days after stitch-hole abscess occurred in the abdominal wall, which communicated with the anterior surface of the womb. Through this abscess some of the buried silk sutures from the uterine wall were discharged. Bacteriological examination of the pus showed the white bacillus of the skin to be the germ present. It was found that the patient had passed her finger beneath the dressing and infected the wound, because she wished to remain in the hospital. She subsequently made a good recovery, the uterus being small, partly movable, and adherent to the anterior abdominal wall when she was discharged. It is undoubtedly better not to pass the stitches through the decidua in closing the wound. As the womb becomes adherent to the abdominal wall in these cases, stitch-hole abscess must not be neglected as a cause for suppuration in the uterine stitches.]

Credé's Silver Ointment in Puerperal Sepsis.—In *Obstetrics*, 1899, No. 2, JONES contributes a paper upon this subject.

Statistics show that between 100 and 200 deaths occur yearly from puerperal sepsis in New York. In addition to other methods of treatment, he calls attention to the use of Crédé's silver ointment by inunction.

The preparation of silver which is employed is not a salt of silver, but is soluble, uncombined metallic silver made into an ointment 15 per cent. strong. Three grammes of the ointment contain about four and one-half grains of pure silver. This ointment has been used once in twenty-four to thirty-six hours in acute and in chronic cases twice daily. It is rubbed into the body at some distance from the point of infection, and should be thoroughly carried into the skin and subjacent tissues. The results of the treatment are immediate improvement in the symptoms, beginning within from three to ten hours.

Jones's case was as follows: The patient was a delicate woman, aged twenty-one years, primipara, delivered after tedious labor, necessitating dilatation of the cervix and the use of forceps. The placenta was firmly attached and had to be removed. There was no hemorrhage and but little laceration. Antiseptic precautions were employed, and the uterus was douched with hot lysol solution and the vagina with bichloride solution. The lochia did not become foul, but on the third and fourth days there were fever, chills, and sweat. The patient was anæsthetized, the uterus scraped with the finger, thoroughly douched, and packed with iodoform gauze. Septic nephritis was present. The patient gradually developed general septic absorption. On the eleventh day her condition was critical.

Between one and two drachms of Créde's silver ointment was rubbed into the inner surface of the thigh, and repeated on the following morning. A rapid and marked improvement followed, the patient's temperature falling to normal and her pulse gradually improving. Five days afterward there was again fever and rapid pulse, when two inunctions were given twelve hours apart. After this inunctions were given daily in small quantity for four days, and then at intervals.

No evidence of toxic action by the ointment could be obtained by examining the urine or in any other way. Altogether about one and one-quarter ounces of the ointment were employed. The patient made a good recovery by the twenty-seventh day.

Management of the Placenta in Abdominal Pregnancy.—AYRES, of New York (*Obstetrics*, 1899, No. 2), contributes a paper upon this subject, in which he gives the results of clinical observation and also of experiments.

He would choose a vaginal operation when the fœtus has already perforated the vagina or when it is suppurating or pressing with the head closely against the vaginal wall. If bleeding is slight the placenta should be removed and the cavity drained. If the fœtus is living abdominal section is indicated, and the fœtus should be first removed without the placenta. If the placental circulation is active the operator must control hemorhrage by ligating the ovarian and uterine arteries before he separates the placenta. In the effort to control hemorrhage during the removal of the placenta the aorta may be compressed and the bleeding surfaces subjected to pressure by hot gauze. If the ovum is extraperitoneal it should if possible be enucleated, and the uterus should also be removed if necessary.

If the placenta cannot be removed the sac may be stitched to the abdominal wound, packed with gauze, and the cord cut off close to the placenta. When the placenta is within the peritoneal cavity it may be injected through the vessels with a solution of tannin and salicylic acid or with formaldehyde, the cord cut short, the sac trimmed off, and the wound closed. It may become necessary, should disturbance occur, to remove the placenta by a secondary operation.

When the fœtus is recently dead an immediate or a delayed operation becomes elective. If the child has been dead a month or longer it should be at once removed, and the placenta, when macerated or putrid, must also be taken away.

The Treatment of the Incarcerated Pregnant Uterus by an Elastic Bag.—In the *Centralblatt für Gynäkologie*, 1899, No. 5, WESTPHALEN reports an interesting case of retroversion of the pregnant uterus which became incarcerated and which was restored to normal position by the use of an elastic bag.

The patient had borne six children. She was in the third month of pregnancy, and for three weeks had suffered from disturbance in the functions of the bladder and pain. Both legs had swelled and had been swollen for eight days. Obstinate constipation was present. The womb was retroflexed beneath the promontory of the sacrum. Efforts to replace it by manipulation failed. A further attempt was made with the patient under an anæsthetic and also in the knee-chest posture. The womb could be brought up to the promontory of the sacrum, but could not be replaced. Accordingly, a large elastic bag was inserted within the vagina and distended, and the patient was placed upon her side with the pelvis considerably raised. When the patient was next seen it was found that the swelling in the limbs had subsided, the symptoms had disappeared, and the womb had become replaced. Further treatment consisted in keeping her in bed, lying upon the side for a short time only.

Perforation and Cranioclasis with the Three-bladed Cranioclast.—In the *Monatschrift für Geburtshülfe und Gynäkologie*, 1899, Band ix., Heft 1, WALTHARD contributes a paper upon this subect. He finds that in Switzerland, in the period from 1892 to 1896, inclusive, in 441,539 births, there were 15,975 births of dead children, and that of these 248 were craniotomies. Of this number, 80 were performed in hospitals, and 168 in private houses. It is evident from these statistics that the general practitioner must often perform craniotomy and that he should be possessed of the safest and most efficient instruments for this operation.

He also draws attention to the injuries which the mother often receives when craniotomy is performed, from bruising of the tissues of the birth-canal. He describes a very interesting case in which the anterior lip of the cervix became very much bruised and torn, and in which it was amputated at the time of labor. When the tissue which was removed was examined it was found to contain abundant streptococci.

Much weight is laid upon the importance of crushing the head in each instance before it is extracted. Hence those instruments which collapse the head by drawing it against the pelvic walls are inferior to those which crush it before extraction. Instruments employed for this operation must be of such a character that they can readily be applied to the fœtal head, and that during the extraction they will not crush or splinter the bones.

Walthard has obtained his best results by the use of a three-bladed cranioclast, and reports eleven cases in which the instrument was successfully employed. The centre branch contains a boring extremity which is carried deeply into the centre of the fœtal head as far as the base. The other blades are then applied to the sides, and the skull thoroughly crushed and removed. The form of instrument employed was that originally devised by Auvard, modified by Zweifel and also by Walthard.

[The basiotribe by Tarnier should not be forgotten in the consideration of this subject. This instrument probably suggested to Auvard and to others the modifications which they have employed. Although these instruments are all useful, still an experienced operator will seldom fail in the use of Braun's cranioclast and any simple crusher like Lusk's cephalotribe.]

A Malignant Blighted Ovum.—VOIGT (*Monatschrift für Geburtshülfe und Gynäkologie*, Band ix., Heft 1, 1899) contributes a very interesting paper upon a subject which has occasioned much discussion, namely, malignant growth of the uterus following pregnancy and labor or abortion.

The patient was aged fifty-three years. She had had eight children, the youngest thirteen years old. In her early married life she had two miscarriages. In her fifty-third year there was disturbance of menstruation with flooding, and the application of a tampon was followed by the expulsion of a blighted ovum. After this she continued to bleed at intervals except when recumbent. A diagnosis was made of deciduoma malignum. A preliminary curetting was done and considerable decidua and remnants of the ovum were removed. This was followed by a chill and fever, and cultures were made from the lochial discharge and also from the blood taken from a vein in the arm. Streptococci were found in the lochial discharge, while the blood was sterile. Accordingly, the uterus was removed through the vagina. The patient made a good recovery, complicated by thrombosis of the smaller saphenous vein.

An examination was made of the specimens, and deciduoma malignum was not present. On the posterior wall of the uterus there was an area where the muscular tissue was much softened and injured, and where microscopic examination showed that the cells of the ovum had penetrated the muscular fibre of the uterus. The condition is best described as a malignant mole, proliferating through the muscular tissue, along the bloodvessels, which had almost perforated the uterus. Bacteriological examination of the tissue showed deposit of streptococci in great abundance.

After reviewing the writings of Marchand and others, Voigt comes to the conclusion that in this case cancer was not present. He considers it very significant that no metastases were found, and that following the removal of the uterus the patient promptly recovered. He thinks, however, that had not the uterus been so promptly removed, the growth would have taken on a malignant character, and that a deciduoma malignum would have resulted. In this instance the villi of the chorion had penetrated the venous channels in the wall of the uterus very freely. Fortunately, the process had not yet invaded the veins of the broad ligament, and hence the general blood stream remained free.

Voigt considers the origin of this to have been in the cells of the embryo. He also draws attention to the clinical history of the case and to the success which followed the very prompt removal of the uterus. He considers the syncytium as of maternal origin, and believes that such cases should invariably be treated by curetting.

Conservative Treatment of Chronic Inversion of the Uterus.—EVERKE (*Monatschrift für Geburtshülfe und Gynäkologie*, Band ix., Heft 1, 1899) reports the following interesting case: The patient was supposed to be suffering from a uterine polyp. On examination, it was found that the uterus had been inverted, this accident dating back thirteen years, when a midwife, in endeavoring to remove the placenta, had caused the inversion. Efforts at replacing the womb failing, the operator opened the abdomen and incised the uterus anteriorly and posteriorly at the point of constriction. The womb was then replaced by an assistant, who made pressure upon the fundus through the vagina, and the incisions were readily closed. An excellent recovery followed, menstruation returned and was normal, and the patient's general health was excellent.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

J. SOLIS-COHEN, M.D.,

OF PHILADELPHIA.

Abscess of the Pharynx.—DR. JAMES R. ARNEILL, of Ann Arbor, Mich., reports (*Medical News*, April 22, 1899) a case of pharyngeal abscess which had been diagnosed as tetanus. The difficulty in opening the mouth had followed a bungling extraction of a molar tooth four weeks previously. The successfull insertion of a gag revealed a swollen and inflamed pharynx, an incision into which evacuated a large quantity of pus, with great relief to the patient.

A Case of Scabbard-like Compression of the Trachea by Hypertrophied Thymus Gland.—M. LANGE, who recently pulished a case in the *Jahrbuch f. Kinderheilkunde*, has reported an analogous one to the Medical Society of Leipsic at its meeting in December, 1898 (*Münch. Med. Woch.*, 1899, No. 3; *Journal Hebdomadaire de Laryngologie, d'Otologie, et de Rhinologie*, 1899, No. 8). The child was four months old, and had suffered for fourteen days with paroxysms of spasm of the glottis, which could not be modified by medical treatment. The patient died a few days later during one of these spasms. The one paroxysm witnessed by Dr. Lange differed essentially from spasm due to impeded respiration, there being thirty movements a minute, but these were regular and sonorous. There was cyanosis, flexion of the fingers, and clonic contraction of the extremities, the paroxysm lasting between three and four minutes, and obstinate bronchitis existing at the same time.

At the autopsy the enlarged thymus gland was discovered to be adherent to the pericardium. It was 8 cm. in length, 5 cm. in breadth, and 2 cm. in thickness. The heart was very much hypertrophied, especially in the left ventricle, which was at the same time very much dilated. This hypertrophy of the left ventricle was attributed to compression of the ascending aorta by the thymus. A cast was taken of the trachea, and showed considerable flattening of its inferior third.

Paralysis of the Larynx.—In a case of paralysis of the right vocal band in the phonatory position occurring in a case of carcinomatous stenosis of the œsophagus, DR. JOHN SENDZIAK, of Warsaw, detected (*Journal of Laryngology, Rhinology, and Otology*, March, 1899) the cause of the paralysis by using the Röntgen rays, confirming his opinion that it was due to compression of enlarged glands and not to the carcinoma itself. On transillumination both in front and behind the glands were distinctly seen in the shape of irregular darkspots on the right side of the thoracic cavity at the level of the aorta, while the left side of the thorax did not present any changes.

MR. R. LAKE reports (*Ibid.*) a case of right recurrent paralysis with paresis of the trapezium, sternomastoid, and palate, with slight ptosis and facial paralysis, all on the same side. The patient, a man, aged thirty-six, had been stabbed over the right eye eleven years previously, and had subsequently had epilepsy, the last attack twelve months previous. There was no history of syphilis.

Laryngismus.—At a meeting of the Medical Society of the Hospitals, Paris, March 17, 1899 (*Medical News*, April 22, 1899), SEVESTRE spoke of the treatment of spasm of the larynx. This necessitates tracheotomy or prolonged intubation, and he attributes the affection to ulceration of tissues below the glottis.

Thyrotomy for Malignant Growths.—SIR FELIX SEMON recently presented to the Laryngological Society of London (*Journal of Laryngology, Rhinology, and Otology*, March, 1899) two cases of epithelioma and one of sarcoma of the larynx treated by thyrotomy, and keeping well two and a half years, one and a half years, and six months respectively after operation.

Tubular Epithelioma of the Nose.—DR. BRONNER, of Bradford, reports (*Journal of Laryngology, Rhinology, and Otology*, March, 1899) a case of removal of a growth the size of a large pea from the nasal mucous membrane just above the anterior part of the lower turbinated bone of a man forty-seven years of age. The growth had been removed about ten years ago, and there had been no recurrence.

MR. BUTLIN thought, from the appearance of the specimen, that it would be very difficult to decide whether it was an adenoma or carcinoma, and suggested that sections should be made for the purpose. The report of the Clinical Research Association had been that "the growth was maligant, of an epithelial type, and may be classed with the tubular epitheliomata. At the periphery beneath the mucous membrane tubules could be seen."

Extraordinary Case of Fibroma of the Nose.—DR. SENDZIAK, of Warsaw, reports (*Rêvue Hebd. de Laryngologie, d'Otologie et de Rhinologie*, 1899, No. 7) a case which occurred in a boy fourteen years of age, and had existed some five years without extension to adjacent structures, maxillary sinus or orbital cavity. Several successive abortive attempts at intranasal removal with the electric snare and with the cold wire had been attended with serious hemorrhages. Finally, a considerable mass was removed with the cold snare without hemorrhage, but a large quantity of serous fluid was discharged instead of the expected blood. This was followed by great relief and a considerable continuance of the serous discharge. On examination the position of the tumor seemed to be occupied by membrane, probably the sac of the cyst. It is supposed that the formation of the cyst in the sarcomatous tissue was the probable result of irritation from the repeated operations.

HYGIENE AND PUBLIC HEALTH.

UNDER THE CHARGE OF
CHARLES HARRINGTON, M.D.,
ASSISTANT PROFESSOR OF HYGIENE, HARVARD MEDICAL SCHOOL,
AND
EDWARD F. WILLOUGHBY, M.D.,
OF LONDON.

Botulism from Fish.—DR. R. DAVID (*Deutsche medicinische Wochenschrift*, 1899, No. 8) reports in detail five interesting cases of poisoning due to stale fish. The cases are remarkable for the variety of manifestations, the length of time that elapsed before the appearance of the symptoms, and, in two of them, the severity and duration of the illness. The afflicted persons, adult members of one family, ate on March 19, 1898, some raw red herrings, which gave off odor indicative of commencing putrefaction. Each ate the same amount, a whole fish; but whether each fish was equally advanced in decomposition cannot, of course, be determined, and the differing degrees of severity of effects may be explained by unequal susceptibility. The father and mother, aged, respectively, sixty-five and sixty-seven years, suffered least; the son, aged thirty-one years, was affected more seriously; the two daughters presented unusually severe and complicated symptoms.

The first effects were manifested by the son, who, on the second day, was seized with loss of appetite, disagreeable eructations, vomiting, diarrhœa, dryness of the throat, and general weakness. On the following day he was better, but soon became worse. Diarrhœa was followed by obstinate constipation, which finally yielded with difficulty to cathartics. Five days later he had dimness of sight, which was followed after a week by double vision and difficult deglutition. The symptoms gradually abated, and on May 27th there was distinct improvement of sight. On June 2d glasses were hardly needed.

The mother first showed symptoms on the fifth day, when nausea, constipation, and dryness of the throat appeared. Several days later she had double vision and difficult deglutition. The father's case began on the ninth day, and presented similar symptoms, which disappeared in six weeks. One of the daughters was seized on the third day with bad taste in the mouth, constipation, and dryness of the throat, followed in six days by dimness of near vision, then by double vision, paralysis of accommodation, and difficult swallowing. As was the case with the others, the temperature, circulation, and urine remained normal. On May 2d there was complete inability to swallow, and it was necessary to introduce food by means of a stomach-tube. There was slight ptosis of the right eye, then of both; the voice was nasal, the gait was affected, and the pulse became very small, though not very rapid. On May 9th bladder symptoms, which had been gradually appearing, culminated in paralysis of that organ, and after the 13th there came a variety of bladder and abdominal symptoms. In the first part of July she felt completely well, but a month later (August) she suffered a slight relapse, with reappearance of constipation, difficult deglutition, and disturbance of vision, which persisted to some extent into September. Complete recovery did not occur until October, almost seven months after the disturbance began. The other daughter showed the first symptoms after the lapse of a week. These were in the main like those of her sister, but were more severe and extensive. She began to improve in May, and then ensued alternate improvement and loss of ground, better one day and worse the next. On the 15th there was pain in the left hypochondrium; on the 17th an eruption like that of scarlet fever over the whole body, with albuminuria, but no casts. On the 19th severe pain in the left hypochondrium, less in the right, and tenderness in the region of the kidneys, with epistaxis, disappearance of the rash, slight desquamation, and improved vision. At the end of May the albuminuria and pain in the region of the kidneys had nearly disappeared, and deglutition was perfect. On June 2d heart complications appeared, which persisted into November, when hypertrophy was established. In August, after a general improvement, there was a relapse like that which occurred in the case of her sister. Improvement was well established in October, and in November she had almost wholly recovered.

It was unfortunately impossible to make a bacteriological and chemical examination of the fish, because no material was obtainable.

[Had it been possible to make an investigation of the food material in this case it seems most probable, from the great similarity of the symptoms to those reported by Van Ermengen, due to eating infected raw ham (see this JOURNAL, July, 1898) that the same organism, *bacillus botulinus*, would have been found to be the cause of the trouble. The longer period of incubation in these cases is perhaps the most striking difference.—C. H.]

A New Method of Estimating Moisture in Walls.—DR. G. MARKL (*Archiv für Hygiene*, xxxiv. Heft 1) has devised a new scheme for determining moisture in mortar and plastered walls which seems likely to supersede entirely the methods heretofore in use, which, on one account and another, do not generally commend themselves, although they yield accurate results. His process is based on the fact that alcohol changes its specific gravity as it absorbs water. It is quickly carried out, requires no elaborate apparatus, and yields sufficiently accurate results. From 10 to 50 grammes of plaster are treated in a dry flask with 150 c.c. of strong alcohol of known specific gravity. The mixture is well shaken, filtered quickly through a dry filter, and then the rise in the specific gravity of the alcohol, due to the absorption of water, is determined. This is easily translated into percentage of water taken up. A series of comparison tests and analyses showed but a very slight difference in results, the differences being due to solution of minute amounts of the constituents of the material, as lime, common salt, nitrates of calcium and sodium, chloride of calcium, and others, but the amounts taken up in the alcohol are so slight as to be unworthy of notice.

The Germicidal Value of Proprietary Disinfectants.—DRS. HARRINGTON and R. M. PEARCE (*Journal of the Boston Society of Medical Sciences*, March,

1899) have made chemical analyses of a dozen of the popular proprietary disinfectants recommended for use in the sick-room, and have determined their germicidal value in the treatment of typhoid stools, tuberculous sputum, and diphtheria membrane. The materials treated were exposed uniformly to the action of the several disinfectants for two hours. Cultures were then made in fresh bouillon, and at the expiration of forty-eight hours the result, growth or no growth, was noted. In the case of sputum the process was different; the sputum which had been supposably disinfected was inoculated into the subcutaneous tissue of guinea-pigs, which, unless they died sooner, were killed at the end of six weeks. A control animal killed after five weeks showed typical tuberculous lesions.

The bacteriological tests showed that not one of the agents most commonly sold can be regarded as a safe and trustworthy disinfectant. Each one was given ten separate tests. Three of them proved to be absolutely inert, and the others gave from 30 to 90 per cent. of unsuccessful results. The results were far from uniform in repeated experiments with the same agent; thus, it might sterilize one typhoid stool and show no result with another. Only one of the entire twelve succeeded in sterilizing sputum, and that one is not sold as a general disinfectant, but as an "air purifier." Carbolic acid, 5 per cent.; formaldehyde, 1 per cent., and a 5 per cent. solution of a preparation containing cresols were also tried on the same objects. The carbolic acid was successful in only two out of six trials, one of the two being with sputum. The other two killed the organisms in every case.

Chemical analysis showed that the ingredients used are such as have a reputation as disinfectants, and that the preparations are not intentional frauds. The commonest ingredients were chloride and sulphate of aluminium, chlorides of zinc, magnesium, sodium, and potassium. Two contained copper, one lead, and one iron salts. One was wholly chloride of zinc, another was a plain solution of permanganate of potassium, another was a fairly strong preparation of chlorinated soda, and three were strong smelling preparations containing neutral tar oils.

The proprietary disinfectants are not only unreliable, but are expensive, enormously so in comparison with the simple and effective 1 per cent. solution of formaldehyde.

Life-duration of Pathogenic Bacteria.—PROFESSOR A. GAERTNER (*Zeitschrift für Hygiene und Infectionskrankheiten*, xxviii. Heft 1) has made an investigation of the influence of manure and compost on the life of pathogenic bacteria, with special reference to the disinfecting action of the rise in temperature, which under favorable conditions is considerable, the action of other bacteria present, chemical changes, lack of oxygen, and excess of carbon dioxide. In order to approximate natural conditions he made beds of horse-dung and cow-dung, with and without straw, garden soil, fecal and peaty matters, and buried in them, in wire baskets at varying depths, bacterial cultures, including cholera, typhoid, tuberculosis, chicken-cholera, and swine-erysipelas, mixed with human and animal feces. The beds began to heat very soon, and by the seventh day reached 70° C. in September, and 47.5° C. in October, and slowly cooled. In the beds made with human feces and earth the temperature never went above 30° C., and usually ran lower.

In winter there was no very marked rise, and in February it did not exceed 5.5° C. The organisms were destroyed the more quickly the higher the rise in temperature; but other factors, such as lack of oxygen, accumulation of carbon dioxide, etc., come into play. In summer they die more quickly than in winter; they may live months in cold weather. Typhoid and cholera were the least resistant of those tried; swine-erysipelas lasted twice as long, and chicken-cholera and tuberculosis were found to be virulent after months of exposure.

DR. MARTIN FICKER (*Ibid.*, xxix. Heft 1) reports the results of a research on the influence of dryness, moisture, heat and cold, and other conditions on the life of the organisms of cholera, typhoid, diphtheria, and plague. The experiments were conducted with observance of the greatest care to secure agreement of conditions in all respects as to age and source of cultures, culture media, etc. Silk threads, dust, and other matters with varying physical and chemical properties were avoided, and the organisms were handled all in the same way on cover-glasses of one quality. They died more quickly when exposed in thin layers, and in thicker layers they retained their vitality longer in the desiccator than when exposed outside. Air in motion is more inimical to them than in a state of rest. The older the culture, other things being equal, the quicker it dies; the more virulent it is, the longer it resists. Alternation of dryness and moisture hastens the death of all four kinds in an extraordinary degree. In moist atmospheres life is retained longer with low temperatures, and old cultures live longer than new ones. In dry air the older cultures succumb earliest. In a moist atmosphere cultures of cholera one day old died in one to one and one-fifth days, while cultures five days old lasted from thirteen to sixteen days. The composition of the fluids in which the bacteria are has a material influence, and the thicker the sowing the longer the life-period. Old cultures show generally less resistance to heat than younger ones, but greater virulence is accompanied by greater resistance.

Leprosy in the United States.—In the report accompanying Senate bill 2904, providing for the investigation of leprosy in the United States (*Public Health Reports*, March 10, 1899) appears a letter from the Supervising Surgeon-General of the Marine-hospital Service suggesting the probability that there are many more cases of leprosy in the country than have been recorded. No systematic inquiry has been made with regard to the origin and prevalence of the disease. Recent investigation and study have demonstrated that quite a number of obscure forms of nervous and skin diseases are nothing more or less than leprosy.

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THE RELATION OF IDIOPATHIC DILATATION OF THE COLON TO PHANTOM TUMOR, AND THE APPROPRIATE TREATMENT OF SUITABLE CASES OF THESE AFFECTIONS BY RESECTION OF THE SIGMOID FLEXURE.

By Reginald H. Fitz, M.D.,
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In 1838, Richard Bright[1] published his *Observations on Abdominal Tumors and Intumescence*, in which he stated that "there is one class of cases more particularly liable to lead the unwary and inexperienced into error respecting the disappearance of an abdominal tumor; I mean cases of hysterical distention of the bowels; for, although the swelling in these cases is essentially tympanitic, yet occasionally, from the singular way in which the intestines are partially distended, and remain so for days and weeks at a time, they sometimes give completely the forms of tumors; and sometimes indistinct fluctuation may arise from fluid feces, or even from the coexistence of a distended bladder; and sometimes the large accumulation of hardened feces has led to the belief of a more solid tumor." He reported the case of a woman, aged thirty, seen many years before in Guy's Hospital, with a supposed abdominal tumor strongly resembling an encysted tumor. "But there were connected with this supposed tumor so many other ailments, embracing fits of hysterics, epilepsy, paralysis, abdominal and lumbar pains, so varied and so changing, that a little observation was sufficient to convince any experienced person of its real character." The patient, however, again entered the hospital in 1824, complaining of abdominal pain and having hysterical symptoms. She had been seen by a surgeon who had proposed to excise the tumor which produced the swelling. A median incision was made for this purpose, but a tumor not being found, the wound was closed, and was not wholly healed when Dr. Bright saw the patient. Her health was in a most unsatisfactory state from a frequent tendency to diarrhœa and from a succession of pains, with occasional distention of the abdomen. She remained in the hospital some three months, during which the swelling varied considerably, and on one or two occasions was reported to have subsided entirely.

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[1] Guy's Hospital Reports, London, 1838, iii. 256.

In the course of the subsequent sixteen years, as appears in an article entitled "Cases under the Care of Dr. Addison and Dr. Gull,"[1] several instructive examples of the affection in question were observed by these physicians, the latter of whom is stated to have been the first to apply the term "phantom tumor." Attention was called by them to the importance of spasmodic rigidity of a part of the abdominal parietes as "one of the most frequent sources of deception. An hysterical patient is quite capable of making a circumscribed portion of the abdominal wall rigid and hard while the rest remains comparatively flaccid. . . . The recti muscles are peculiarly apt to be the seat of these contractions, which may, however, also occur in the lateral regions of the abdomen. . . . Hardened masses of feces are probably, however, the most frequent of the exciting causes of the affection."

Later, the idea of phantom tumor became so extended as to comprehend any circumscribed mass in the abdomen which should appear and disappear from time to time. Greenhow,[2] for example, reported five cases as "Phantom Tumors of the Abdomen." The first two were apparently pedunculate pelvic tumors, the third and fourth might have been a movable kidney, while the fifth, presumably, was a movable kidney or spleen. All were regarded as spasmodic, seated "probably in the abdominal muscles, although in every instance the tumor appeared to be in the abdominal cavity." Furthermore, evanescent tumors of the trunk and of the extremities have been reported by some writers as instances of phantom tumor. Dilated and prolapsed stomachs, intermittent hydronephrosis, and transitory indurations of the mammary gland also were thus designated.

We are indebted to our honored associate, J. M. Da Costa,[3] for a restoration of the original conception of the term and also for a most important amplification—namely, that phantom tumors are not necessarily limited to hysterical persons. According to him, "The chief element in their production is partial contraction of the abdominal walls, particularly of the recti muscles, with more or less tympanitic distention of either the stomach or the intestine. Then a certain amount of constipation, and a large quantity of subcutaneous fat in the omentum, will modify some of the phenomena; for I do not think that all cases are precisely alike or can be explained according to an exact formula. The frequent occurrence of these phantom tumors in hysterical persons is also to be taken into account, and the coexistence with hysteria may show itself in fits of hysteria, in convulsions, or in hysterical palsy. But do not fall into the mistake of supposing any necessary connection. I have met with these tumors in men who were not very impressionable."

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[1] Medical Times and Gazette, London, 1851, ix. 343.

[2] Lancet, London, 1857, i. 58.

[3] Medical Times, Philadelphia, 1871, i. 449.

These views concerning the nature and the method of origin of phantom tumors have prevailed with slight modifications up to the present time. Osler[1] and Tyson[2] adopt the explanation of Gowers, according to whom phantom tumors result from a relaxation of the recti, a spasm of the diaphragm and abdominal muscles, gaseous distention of the intestine, and an arching forward of the spine. Wharton Sinkler, in the Loomis-Thompson system,[3] states that "Sometimes an enormous amount of gas accumulates in the stomach and intestines, which distends the abdomen to an extraordinary extent. This condition constitutes the so-called 'phantom tumor' sometimes seen in hysteria. Constipation is frequently present, and the bowels in some cases may not be opened for weeks."

In reviewing the reports of cases of phantom tumor published in the various medical journals it is evident that the described tympanitic tumors are by no means of uniform significance. They vary not only in extent, involving more or less of the abdominal cavity, but they vary also in duration, in severity of symptoms, and in result. Though found usually in adult females, and simulating in shape and size the pregnant uterus at full term, or an ovarian cyst, they have been observed in young girls and in men. As a rule, of long duration and of slow and gradual formation, they may increase rapidly within a few months or within a few days. Mattison's[4] patient supposed herself pregnant. Menstruation had ceased, morning sickness, quickening, enlargement of the abdomen and breasts—all were observed at the proper time and in regular course. Ramskill and Jones[5] state that their patient, a girl of nineteen, had been several years in attendance at the Metropolitan Free Hospital. Examinations made two years apart showed no material change in the size of the tumor, which eventually caused the patient to appear like one at the full period of pregnancy. Bright's original case was observed during a period of many years in which the tumor was thought to be an ovarian cyst, and the patient was operated upon for its extirpation. Storer's case, reported by J. C. White,[1] was a girl of fourteen, in whom the tumor had been present for a year, having increased rapidly in size within eight months.

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[1] The Principles and Practice of Medicine, third edition, 1898, 1114.

[2] The Practice of Medicine, 1896, 1072.

[3] American System of Practical Medicine, 1898, iv. 705.

[4] Medical and Surgical Reporter, 1863, x. 201.

[5] Medical Times and Gazette, London, 1859, ii. 579.

Although chronic, persisting, or recurring constipation is the rule, acute intestinal obstruction sometimes is stimulated, as is illustrated in the following case coming under my observation: In 1894, a woman, aged twenty-one years, was referred to me by Dr. W. O. Hunt, of Newton. During early childhood she had occasional convulsive attacks. At the age of sixteen or seventeen she suffered for a year from nervous exhaustion. In the two years previous to my first visit she had repeated attacks of severe pain in the lower abdomen, each lasting some ten minutes, at irregular intervals, and without obvious cause. Shortly before the visit they had occurred two or three times daily, and occasionally were associated with a discharge of blood from the rectum. Dejections were usually well-formed, and as many as two daily. There was no loss of weight or color, and there was nothing abnormal found by me on physical examination. Three weeks later an attack of pain was followed by an arrest of intestinal peristalsis, neither gas nor feces being evacuated, despite the use of saline laxatives and enemata. At the end of four days, during which vomiting had occurred, the symptoms of obstruction still continued. The abdomen was markedly swollen, and a distended intestinal coil was to be felt in the left half of the belly. Three pints of water were injected into the rectum without causing discomfort. A large quantity of pale urine was voided. At this time Dr. M. H. Richardson saw the case and agreed as to the expediency of an exploratory incision. After the patient was etherized the abdomen again was palpated, when gas escaped from the rectum; repeated firm pressure caused the continued expulsion of gas, until the entire abdomen became everywhere soft and yielding to the touch. Since then there has been no return of the previous symptoms.

It is recognized that the nature of the disturbance in this case is not wholly free from doubt, but a diagnosis of hysterical tympanites seemed the most probable. It was based upon the neurasthenic, almost hysterical, antecedents of the evidently neurotic patient, whose general appearance was that of one in vigorous health; upon the immediate relief afforded by pressure when she was etherized, although all efforts without anæsthesia were of no avail, and, finally, upon the subsequent complete immunity from all abdominal discomfort.

In the diagnosis of phantom tumors of the abdomen special stress is laid upon their disappearance under anæsthesia. O'Donnell[2] had a male patient whose tympanitic abdomen was as large as that of a woman in the eighth month of pregnancy. Under chloroform the enlargement immediately disappeared, and the abdomen for a while remained in a normal state. Simpson previously had produced the same result in like manner in a woman who supposed herself ten months pregnant. Ramskill and Jones[1] also administered chloroform to their patient, who, for two years, was considered to have suffered from "hysteric tympanites or phantom tumor of very large size." As the patient became unconscious the abdomen at once flattened until there was not the slightest appearance of a tumor. As the effect of the chloroform passed away the abdomen quickly resumed its previous shape, and was nearly as prominent as ever when consciousness was regained.

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[1] Boston Medical and Surgical Journal, 1855, liii. 19.

[2] Medical Times and Gazette, London, 1855, ii. 47.

A notable fact in the history of this subject appears from the investigation of the periodical literature of recent years. Reports of instances of phantom tumor are rarely to be found, whereas within the past fifteen years a considerable number of cases have been published which closely simulate in their characteristics those of phantom tumor, and in which the tumor has proved to be a permanent enlargement of the colon. Little and Calloway,[2] to be sure, had reported previously a case of enormous dilatation with hypertrophy of the colon, especially of the sigmoid portion, in an imbecile thirty-four years of age. The abdomen was forty-five inches in circumference at the navel, and its enlargement was found to be due almost wholly to the distended large intestine. The transverse colon was about six inches in diameter, and the descending colon and sigmoid flexure formed an immense pouch extending from the left hypochondrium into the umbilical and hypogastric regions. Peacock[3] also described a case of fatal constipation from excessive dilatation of the colon. The patient, twenty-eight years of age, had been constipated from birth, and had suffered much from flatulence. Although he enjoyed relatively good health until within six weeks of his death, the symptoms of obstruction then became grievous, and the abdomen appeared like that of a woman just previous to confinement. The large intestine from the cæcum to the upper part of the rectum was found enormously distended, and contained fully fifteen quarts of semi-solid feces.

In 1884, however, Gee[4] published his communication on "Idiopathic Dilatation of the Large Intestine," which proved to be the immediate predecessor of a considerable number of articles on the same subject. He stated that "One kind of great and fatal tympanites is an extreme dilatation of the large intestine in whole or in part. The dilatation may be called idiopathic, inasmuch as it constitutes the whole of the disease, and the foregoing conditions or causes cannot be discovered.

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[1] Loc. cit. [2] Transactions Pathological Society of London, 1851. iii. 106.

[3] Transactions Pathological Society of London, 1872, xxiii. 104.

[4] St. Bartholomew's Hospital Reports, London. 1884, xx. 19.

This disease may be compared with a like dilatation, also called idiopathic, which affects the œsophagus and the stomach. . . . . At present, for want of a better explanation, I think that mere constipation and retention of wind are the cause of the dilatation." His illustrative case is that of a boy of four and a half years, who was constipated when three months old, and whose abdomen continued to swell from the time he was a year old.

The purport of these publications is to maintain that increase in the size of the large intestine at times occurs without any obvious organic or mechanical cause other than fecal accumulation, sufficient to produce discomfort, distress, and deformity, and to prove repeatedly the immediate cause of death. The most constant symptom is constipation and the most positive sign is abdominal distention. Two types of this affection are evident: in the one the disturbance begins early in life, even in infancy; in the other it becomes manifest only at a more advanced age. The former often is called congenital, although the accuracy of this term is to be questioned. To be sure, Peacock[1] and Hughes[2] state that in the cases reported by them there were increasing constipation and abdominal enlargement from birth. One of Osler's[3] patients, an infant of seven months, had but five or six natural evacuations previous to having been seen by him. On the other hand, although the case reported by Walker and Griffiths[4] was observed to have an unusually large abdomen within a few weeks from birth, nevertheless the bowels are said to have acted regularly. Rolleston and Haward[5] state that abdominal swelling began in their patient at the age of two months. In Formad's[6] case, on the contrary, the most remarkable on record for the degree of deformity, constipation first became noticeable at the age of two years. To these cases the following is added:

A girl, fourteen years old, came under my care at the Massachusetts General Hospital in 1894, on account of a swollen abdomen (Fig. 1). She had been constipated all her life, and the enlargement began when she was two years of age, and continued to increase in size up to the date of her admission. Three years before this there was considerable sharp, intermittent pain in the left flank, and a needle was thrust into the abdomen somewhere below the navel on the right side. No fluid was withdrawn. Otherwise she has always been in excellent health. She has attended school regularly and has seemed as strong as other children. There was no complaint of any disturbance whatsoever, with the above exception. She was well developed and sufficiently nourished. The abdomen was much enlarged, measuring thirty-one inches in circumference. It was tympanitic throughout, except in the right iliac fossa, where there was a diffused dulness. The surface was in places slightly irregular and ridged from peristalsis of the underlying intestine. On palpation the abdomen was everywhere soft and without tenderness. The bowels were kept open by enemata, and although several evacuations might occur daily, there was no material diminution in the abdominal enlargement. The injection of five pints of water caused dulness on percussion in the left half of the abdomen. She remained in the hospital nearly four weeks, and several months afterward her mother wrote that there was no improvement, and that she was as "costive as ever." Recent attempts to discover her whereabouts have been unavailing.

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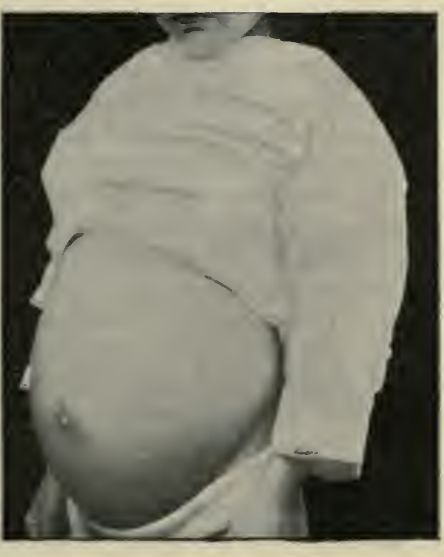
[1] Loc. cit.
[2] Transactions Pathological Society of Philadelphia, 1887, xiii. 40
[3] Archives Pediatrics, 1893, x. 111.
[4] British Medical Journal, London, 1893, ii. 230.
[5] Transactions Clinical Society of London, 1896, xxix. 201.
[6] University Medical Magazine, Philadelphia, 1892, iv. 625.

FIG. 1.



If it be admitted that in certain of the above cases a congenital cause for the dilatation may have existed, it must be recognized also that absolute evidence on this point is lacking. It is apparent, furthermore, that in some of the patients the dilatation began at such an interval after birth as to render the congenital origin very doubtful.

M. Treves,[1] however, in a recent article entitled "Idiopathic Dilatation of the Colon," maintains that all cases of this affection "In young children are due to congenital defects in the terminal part of the bowel, that there is in these cases an actual mechanical obstruction and that the dilatation of the bowel is not idiopathic." He bases this view on the evidence furnished by a patient with dilated colon from whom he successfully removed not only the descending colon, but also that part of the bowel corresponding to the sigmoid flexure and to the rectum, which were represented by a solid-looking though pervious tube eight or nine inches long, and about the size of an adult's forefinger. Support is found for his opinion in the cases reported by Dodd[1] and Atkin,[2] in which there was marked stenosis of portions of the large intestine. He offers, also, in favor of his suggestion the obervations of Osler, Walker, Formad, and of Rolleston and Haward (*vide supra*).

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[1] Lancet, London, 1898, i. 276.

It may be stated in behalf of those who recognize the existence of a genuine idiopathic dilatation of the colon in young children, that there are repeated instances in which the affection begins in early infancy, progresses more or less continuously, and at a laparotomy or a post-mortem examination is without sign of any congenital malformation of the bowel. Such instances are to be found even among those referred to by Mr. Treves in support of his view. In but one of Osler's cases, for example, was the opportunity offered for a satisfactory physical examination of the intestine. After an abdominal section by Halsted, although the entire colon was found enlarged and "the sigmoid flexure was twisted on itself, but not so as to cause any obstruction," no stricture of the rectum could be ascertained. A post-mortem examination was made in the cases reported by Walker, Formad, and by Rolleston and Haward, and no evidence of a constriction was observed.

It would seem more in harmony with the facts to recognize that there are two varieties of infantile dilatation of the colon. The one is due undoubtedly to a defect of development, hence is a true form of congenital dilatation, the result of malformation of the bowel, existing at birth and then at once producing its disturbances. The other makes its appearance within weeks or months after birth, gives no evidence of any arrest of development of the bowel, and for purposes of classification should be called idiopathic. Infantile dilatation of the colon thus may be congenital or idiopathic, but a congenital idiopathic dilatation of the colon from this stand-point would be a misnomer.

The idiopathic cases properly so called are conceivably those in which defective expulsive power is the prime factor, leading gradually to more or less abundant accumulation of feces and consequent dilatation of the sigmoid flexure, with occasional complete evacuation of the bowel, as in the case reported by Hughes, but with recurring retention extending over a prolonged period. As the lower portion of the bowel, especially the sigmoid flexure, becomes enlarged, an acquired mechanical impediment to the emptying of the descending colon, and perhaps of other portions of the large intestine, is established, giving rise to dilatation and to hypertrophy of the muscular coat. This impediment is likely to become all the greater as the loop of the sigmoid flexure becomes elongated and dilated, with its liability to kinks, even to a twist, as proved to have occurred in the case reported by Osler. In fact, the significance of elongation and dilatation of the sigmoid flexure in the production of twists of this portion of the colon are too well known to require comment. The greater the degree of distention the more impaired becomes the action of the accessory muscles of defecation, especially those of the abdominal wall, and thus may arise the enormous degrees of distention which are the eventual outcome in the cases in question.

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[1] Lancet, London, 1892, i. 1299.

[2] Lancet, London, 1885, i. 203.

The published instances of idiopathic dilatation first made manifest in adult life are relatively few, but may take place under the same general conditions as in this variety of the infantile series. The case reported by Little and Calloway[1] was an imbecile, one of a class notoriously liable to suffer from neglected defecation. Money and Paget[2] state of their patient that the bowels always acted regularly, with the exception that lately they were somewhat constipated. Nevertheless, a big, scybalous mass of stony hardness was found in the colon. The patient of Herringham and Clarke[3] is stated to have been always constipated, at times without a dejection for eight days. Richardson's patient,[4] a man of forty-seven years, was in good health until the age of forty, when constipation became apparent and increased in severity. Finally symptoms of acute obstruction arose, and a half twist of the sigmoid flexure was found, corrected, and stitched to the abdominal wall. Five months later another attack of acute obstruction occurred, and again this portion of the colon was found twisted. It then was resected successfully, with subsequent relief of the symptoms.

Occasionally cases may be encountered which occupy an intermediate position between the infantile and the adult groups. I am indebted to my colleague, Dr. F. B. Harrington, of Boston, for the notes of such a case.

His patient, about forty years of age, since childhood had a distended abdomen, with constant abdominal distress and much difficulty in emptying the bowels. At the age of twenty years he had an acute affection resembling intestinal obstruction and accompanied with enormous distention of the abdomen. At this time Dr. P. Wadsworth, of Malden, treated him by plunging a trocar through the abdominal wall into the intestine. A great quantity of gas escaped, the swelling subsided, and defecation soon was resumed. Thirteen years later a similar illness occurred, but of less severity. In the subsequent seven years there were four or five such attacks, each lasting from one to four weeks, during which time the patient was confined to his bed, suffering from vomiting and intense pain. Relief followed the passage of large quantities of gas and liquid feces.

The last attack began March 6, 1898, with severe pain and vomiting, unrelieved by rectal enemata or by doses of salts. When seen a week

[1] Loc. cit. [2] Transactions of the Clinical Society of London, 1888, xxi. 103.

[3] St. Bartholomew's Hospital Reports, 1895, xxi. 57.

[4] Transactions of the American Surgical Association, 1897, xv. 585.

later by Dr. Harrington the face was pinched and haggard, the temperature 102° F., and the pulse 120. The abdomen was so distended as to resemble that of a woman with a large abdominal tumor. It was everywhere tympanitic. A median laparotomy was performed, and the cause of the enlargement was found to be the dilated sigmoid flexure, which extended from the pubes nearly to the ensiform cartilage. It was tapped, and enormous quantities of gas and fecal matter were removed. This portion of the colon was then withdrawn from the abdomen and resected. The patient lived for a week, during which time there were frequent movements of the bowels and relief from pain. Death was due to septic peritonitis of a mild grade. The united ends of the large intestine were in good condition, and there was no evidence of any leakage. Dr. Harrington states, "With a similar case in similar conditions I should make an artificial anus and wait for improvement before doing a resection."

In comparing the histories of cases of chronic phantom tumor and of idiopathic dilatation of the colon the similarity in the symptoms of the two affections is beyond question. In each there is marked constipation, frequently leading to the retention of feces. In each there is a tympanitic distention of the abdomen, often of extensive degree, and present throughout a series of years, although subject to variations in size, even to a return of the normal shape in anæsthesia. In each exacerbations of abdominal distress are apt to accompany temporary increase in the size of the abdomen. The phantom tumor is not necessarily limited to persons of hysterical tendencies, and the patient with a dilated colon may be hysterical or neurasthenic. With so striking a resemblance in the clinical characteristics it seems probable that the anatomical changes are identical. Fatal cases of phantom tumor have rarely been reported. Cullen's[1] patient died of inanition. The abdomen had been distended for five years, and the symptoms so suggested ovarian disease as to lead to the thought of ovariotomy. It is stated that no tumor was found at the autopsy, but there is no mention made of the condition of the colon. Even in the case reported by Bright, in which the interior of the distended abdomen was exposed by a laparotomy, we learn merely that no tumor was found. It is obviously inconceivable that such extreme tympanitic distention of the abdomen could exist for so long a time without the presence of gas in the intestines, and from the probability that the function of the stomach and small intestine was, as a rule, but little impaired, it seems likely that the gas must have been accumulated in the dilated large intestine. Furthermore, as already mentioned, examples of chronic phantom tumor, as described by Bright and others, are no longer reported, but cases with similar symptoms are published with satisfactory evidence that dilatation of the colon is the constant characteristic.

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[1] Virginia Clinical Record, Richmond, 1871, i. 153.

The following statement is added for the purpose of confirming the above interpretation of the subject:

Miss ——, thirty-seven years of age, entered the Massachusetts General Hospital in November, 1898. Since the age of fifteen, when "threatened with typhoid fever," she has been subject to periodical attacks of weakness, without obvious cause, occurring two or three times a year, rather increasing in frequency of late. The attack which

FIG. 2.

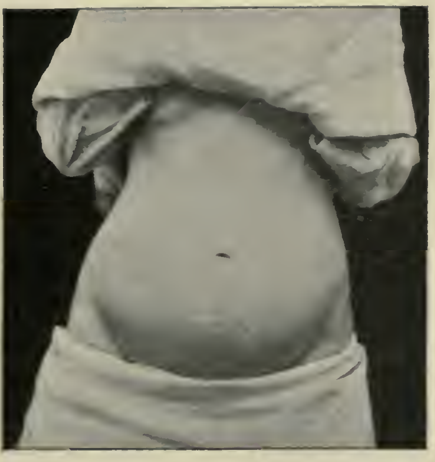
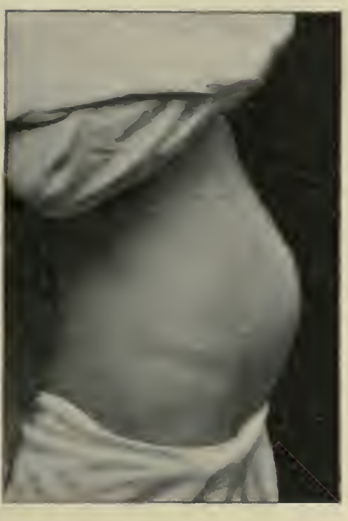


FIG. 3.



took place eighteen months previous has never been wholly recovered from. During this period she has been unable to work, and has been confined to her bed a couple of months at a time on four or five different occasions. The abdomen began to enlarge from the onset of this attack, and gradually has reached its present size (Figs. 2 and 3). During the past year there has been more or less constant pain in the right iliac fossa, in which there is the sensation as of a lump. Of late the pain has extended upward into the right lumbar region, and in the past six weeks it has been worse than ever. For years she has been obliged to use some laxative two or three times a week, and several times a year would have no movement of the bowels for a week. The catamenia have been irregular and painful since the age of fifteen, a space of two years once having elapsed without their appearance. The interval between the successive periods may be from one week to three months. The use of the catheter is at times necessary to enable the bladder to be emptied. She has no appetite, is weak, suffers from constant abdominal pain, and attributes all her discomfort to the condition of her bowels, which causes nausea and short breath. Although there had been some loss of flesh, the face was florid, an appearance stated always to have been present. The waist was small, the epigastrium flat, but below the navel the abdomen was uniformly swollen, tense, and tympanitic to a marked degree, and measured thirty-three inches in circumference. There was diffused tenderness in the right flank. There was no alteration in the outlines of the stomach, spleen, and liver, as determined by percussion. Palpation of the region of the kidneys was rendered useless by the resistance of the overlying muscles. The pelvic examination was negative. There was neither albumin nor sugar in the urine, and the blood showed 68 per cent. of hæmoglobin, 5,616,000 red corpuscles, and 13,400 leukocytes three hours after dinner. The stomach had a capacity of twenty-five ounces of water, and its contents showed free HCl. Lactic acid also was present. When the rectal tube was inserted there was neither obstruction nor escape of flatus, nor did any change follow in the appearance of the abdominal enlargement. After the patient was etherized the abdominal walls became flaccid and the tumor disappeared, but there was no especial diminution in the circumference of the abdomen. There was merely a change of shape, the tumor-like character of which at once reappeared as the senses were recovered. There was much splashing on palpation of the region of the colon, and attempts to inject liquid and air into the bowel produced only a moderate degree of additional distention.

During the patient's stay in the hospital purgatives produced watery evacuations, but neither laxatives nor enemata caused any material alteration in the shape and size of the abdomen. She was informed of the probable cause of her condition and of the doubt of any permanent relief except by a surgical procedure of a severe and serious nature. Any reasonable attempt to enable her to resume an active life was welcomed. She was transferred to the care of Dr. C. B. Porter, who made a median incision, through which the greatly enlarged sigmoid flexure bulged. It was apparent that there was neither an organic stricture nor a fecal impaction, and as her pain had been referred to the right iliac region, and as the vermiform appendix was closely attached to the abdominal wall, Dr. Porter decided to remove the appendix with the hope of relieving the pain.

This operation, speedily recovered from, gave no permanent relief, and she returned to the hospital, in accordance with my advice, for the purpose of having a portion of the colon resected. Dr. M. H. Richardson, who had succeeded Dr. Porter in charge of the surgical ward, reopened the abdomen April 5, 1899, and removed the enlarged sigmoid flexure, which represented the chief constituent of the abdominal swelling, although there was some dilatation of the rectum and the descending colon. Convalescence has progressed favorably and without interruption.

This case presented the essential characteristics, even in its reaction to anæsthesia, of a phantom tumor, occurring late in life in a woman of pronounced neurasthenic type. It likewise showed the features of idiopathic dilatation of the colon free from obvious congenital peculiarities, and having as its sole conspicuous antecedent a constipated habit, but no history of fecal impaction at any time. The phantom tumor proved to be a dilated colon.

In advocating resection of the sigmoid flexure for suitable cases of idiopathic dilatation of the colon or for chronic phantom tumor, in which the former condition presumably exists, I simply follow in the footsteps of Mr. Treves. It was his brilliant operation to relieve a patient from the effects of congenital malformation of the lower portion of the large intestine which first suggested to me the expediency of the above procedure in a case of genuine idiopathic dilatation of the colon.

The history of such cases shows that often under medical treatment the deformity and disability are permanent, generally progressive, attended by suffering, and ending usually in death.

The resection of the dilated sigmoid flexure takes from the abdomen the chief cause of distention and of a fecal reservoir, which has become unnecessary, is burdensome, a source of pain, and menace to life.

It has successfully been removed, together with the descending colon, rectum, and anus, by Treves, in a case of congenital stenosis of the bowel, and the dilated sigmoid flexure alone has been removed by F. B. Harrington and by M. H. Richardson to relieve acute obstruction.

Resection may be preceded by colotomy, as in the case of Treves, and, as Harrington finds, indicated when symptoms of acute obstruction are present. Colotomy in such cases, however, should be merely a temporary expedient to relieve the patient from immediate peril and to permit him to enter into a state suitable for resection. The latter operation is best undertaken when the patient is comparatively free from all acute discomfort.

CASES OF TYPHOID CHOLECYSTITIS ENDING IN RECOVERY.[1]

By J. M. Da Costa, M.D., LL.D.,
OF PHILADELPHIA.

It is only of late years that we have recognized cholecystitis in typhoid fever, and it is generally looked upon as a very serious complication. So, indeed, it mostly is. In a paper which I presented last year to this Association, "On the Significance of Jaundice in Typhoid Fever," and which has been published in its *Transactions* as well as in The American Journal of the Medical Sciences, July, 1898, I stated the results of fifty-eight cases of typhoid cholecystitis I had collected to be thirty-nine deaths and fifteen recoveries, while in four the result was uncertain or not mentioned. It would, therefore, appear that typhoid cholecystitis is fatal in about two-thirds of the cases; in those that got well recovery in fully half the cases was the direct result of operative interference. Yet it is likely that, as we study the subject closely, and learn to recognize more readily this complication of typhoid fever, we shall find that the recoveries are more frequent than supposed. It is from the very grave cases, which alone have been mostly published, that our conclusions have been drawn.

To the list of recoveries from typhoid cholecystitis I can now add three cases, two of which happened in soldiers and one in a young girl. They were all under observation at the Pennsylvania Hospital.

Case I.—M. B., a soldier, aged thirty-two years, with typhoid fever, in whom the Widal test on two occasions gave positive reactions, had many complications in the course of a long illness, such as phlegmasia dolens, otitis media, and swelling of the knee. There was a relapse on the twenty-ninth day of the disease, another one on the sixty-third day, and a third one on the ninety-third day; in the latter malarial organisms were found in the blood. It is not, however, the purpose to give a full history of this protracted and remarkable case, but rather to state that the deep typhoid infection manifested itself also in his gall-bladder, for in the second relapse tenderness was noticed in the upper part of the abdomen, chiefly below the ribs on the right side, and slight jaundice occurred; no tumor was to be felt. An examination of the urine showed bile-pigment, without albumin or sugar or casts being found; the urine was acid, of specific gravity 1020. The temperature, which in this relapse had reached 104° F., had declined to 98° when the jaundice was noticed. There were no marked gastric symptoms. The jaundice and the tenderness slowly passed away. Six days after bile was first detected in the urine this no longer contained it. The patient finally recovered entirely, notwithstanding the many complications.

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[1] Paper presented to the Association of American Physicians at the annual meeting held in Washington, D. C., May, 1899.

In this case, in which the profoundest typhoid fever infection was manifest, the cholecystitis was comparatively light. While there was pain in the region of the gall-bladder and sensitiveness, there was no tumor, and, except for jaundice, which, though slight, attracted attention, it is very likely that the disorder would have been overlooked. In the next case the symptoms were much more marked, and a tumor was evident.

Case II.—C. E. B., a soldier, aged twenty-three years, had a severe case of typhoid fever in which the temperature for thirteen days ranged between 104° and 105° F. There was diarrhœa and cough, and considerable pulmonary congestion, and, later, a broncho-pneumonia on the right side. On the sixteenth day of the disease, when the evening temperature was 104.6° F., soreness to the touch was noticed in the region of the gall-bladder; there was also pain in the abdomen, especially at the upper part, but at first no jaundice. Nor did the examinations of the urine show bile-pigment or sugar or casts. The urine had a specific gravity of 1009 and a trace of albumin. No vomiting occurred. Six days subsequently both pain and tenderness were found to be distinctly localized over the gall-bladder, and a small, round tumor was palpable. No altered hue of the face or conjunctivæ was discernible, but the reaction for bile-pigment in the urine was very marked. The temperature ranged about 102° F.; the stools were liquid, not offensive, nor materially changed; the tongue was clean; there was rigidity of the abdominal walls, especially on the right side. The patient expressed himself as greatly relieved by the local use of the tincture of iodine. Three days afterward the pain had gone, the temperature had declined, and the swollen gall-bladder could be no longer felt. Recovery was complete, but not rapid.

This case is instructive in showing how pain and tenderness, and even tumor, precede the icterus, which, indeed, may only manifest itself by bile in the urine or be wholly absent. The temperature did not rise with the complication. It was high when this started, as it had been throughout the case, and declined, rather than advanced, with the decided manifestations of the malady. The symptoms were very clearly marked, but not typically violent, as they were in the next case.

Case III.—Theresa L., aged eight years, was admitted on February 3, 1899, into the Pennsylvania Hospital with typhoid fever. She had always been a healthy girl; with the exception of having had measles and whooping-cough some years ago, there was no history of disease. When admitted she had been ill for seven days with diarrhœa, cough and fever. Her temperature was found to be 105° F.; the pulse 142; the respirations 32. The liver dulness was small, the abdomen tympanitic; the urine had a specific gravity of 1020, and contained a small amount of albumin, but no casts. Some moist râles were detected at the lower part of the lungs posteriorly on the right side, but no dulness existed. The next day typical rose-spots appeared on the abdomen. The Widal test gave a positive reaction on the tenth day of the disease.

The patient was treated by betanaphtol and very constant sponging, and though the case proved a severe one, the temperature for the first week of her stay in the hospital being often in the neighborhood of 104° F. and the urine having to be drawn by catheter, she did well, and by the twenty-seventh day of the disease it was noted that the temperature was normal or subnormal, with the exception of a single rise to 100° F. Convalescence was looked upon as assured, when the child began to vomit, complained bitterly of pain in the abdomen, and the temperature quickly rose to 104° F. The pulse was 140. The question of perforation and peritonitis at once arose, as well as that of an appendicitis. But the high temperature and absence of collapse were against the former, and the fact that there was no tenderness or swelling in the right iliac fossa or at McBurney's point—indeed, that all the discomfort was at the upper part of the abdomen—set aside the latter. In the next few days the symptoms became more and more significant. The vomiting continued; at first curdled milk with bile-stained fluid, several ounces at a time, was ejected, then the same quantity of a pure, brownish, bilious fluid. Nothing was retained on the stomach—not even water—though a little later one-tenth of a grain doses of calomel stayed down, and small amounts of peptonized milk, and, still later, brandy and cracked ice; but the child had to be almost entirely nourished through the rectum, and sustained by hypodermatic injections of strychnine. There was some looseness of the bowels, and greenish stools were passed. The pain was very great, and she screamed with it; it was entirely referred to the upper part of the abdomen. Considerable tenderness over the region of the gall-bladder existed, and, on palpation, a tumor about the size of a lemon, and having the shape of the gall-bladder, could be felt and even seen through the abdominal walls; both recti muscles were very rigid, the right especially; the tenderness extended to the left hypochondrium.

Applications of ice did some good, but the great restlessness of the child caused them to be exchanged for hot fomentations, which she liked better. The conjunctivæ at first were not discolored, but they became increasingly so, until the jaundice was very perceptible; the urine contained bile-pigment, but no albumin. The temperature—which, soon after the beginning of the attack, marked 101° F., with pulse of 124 and respirations 24—reached 104° F. for a short time, but it soon subsided, and the thermometer indicated between 99° and 101° F., while the tumor and pain were manifest. In the course of the case the whole abdomen became tumid, and the tenderness as marked in the left hypochondrium as in the right. The spleen did not appear to be enlarged; there was no ascites. Abdominal pain, tenderness, and tumor gradually subsided, though even toward the end of the case occasional pain in the region of the gall-bladder recurred. The child became greatly emaciated during the attack, and showed in her face the severe illness through which she was passing. But a gradual recovery took place, and she was discharged from the hospital on March 31st in good condition.

In reviewing this case, the violence of the pain stands out as the most prominent symptom. I have never in any instance of typhoid fever seen it equalled, and the child often shrieked with it. There was no doubt in her mind of its seat; when questioned she always put her hand to the region under the ribs on the right side. The pain was aggravated by the incessant vomiting. In the other cases reported in this paper the jaundice was slight; here it was very marked. The gravity of the symptoms made me think of asking one of my surgical colleagues to perform an operation; but as, when I was considering the propriety of surgical interference, improvement began to show itself, this was deferred, and the child recovered without. From the absence of sweating and chills—though this is not conclusive—I believed the cholecystitis not to be purulent, which influenced my decision. On the whole, this is the most marked case of typhoid cholecystitis ending in recovery which I have met with. It is worthy of note that it occurred after convalescence had set in. Cholecystitis in typhoid fever is a complication generally arising in the third or fourth week of the fever. In one of the cases reported in this paper it came on in the relapse.

The treatment in the cases detailed consisted for the most part in the administration of fractional doses of calomel, frequently repeated, in combating the nausea, and in the local use of ice or of poultices. The former is to be tried first, and is, I believe, the more efficient. Counter-irritation, with turpentine stupes or with iodine, may also be used, and Case I. thought he derived much benefit from this. For the relief of the pain, hypodermatics of morphine may be necessary, and, as in Case III., the circulation may have to be supported by hypodermatics of strychnine and of digitalis.

THE INFLUENCE OF VARIOUS DIETS UPON THE ELIMINATION OF THE URINARY NITROGEN, UREA, URIC ACID, AND THE PURIN BASES.

(From the Pepper Laboratory of Clinical Medicine, University of Pennsylvania. The Phœbe A. Hearst Foundation.)

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Since the publication by Salkowski, in 1897, of his improved method for the estimation of the xanthin bases in the urine, we have been in the possession of a feasible and accurate procedure for the quantitative determination of these important substances. Simultaneously, the researches of Krüger and Salomon have given us reliable qualitative methods for the differential study of the individual members of the purin group. Thus we are now in a position to undertake comparative studies of the relations of these bases to various ages, states of health, diets, and diseases. We possess almost no accurate knowledge of the physiological or pathological relations of these bases. Nearly all the work already done has been carried through with the Krüger-Wulff method, whose unreliability, even for clinical work, has been conclusively demonstrated. Obviously, we need first of all physiological data, and it has been the purpose of these researches, whose partial results are herein reported, to furnish some such data.

I have believed it most advantageous, to the end of a perfect control of the studies, to submit myself to the diet experiments. Thus I was enabled to control specifically every detail of the studies, something which is impossible under other circumstances. My weight is about 160 pounds. My general health is perfect; my constitution is of the robust or plethoric type. The general plan of the studies has been as follows: The specific diet having been entered upon, the collection of the entire daily urine was begun upon the *third* day of the diet, and was continued for *six* successive days. The body-weight was noted before and after each period Between these periods of different diet a mixed diet was employed, except that tea, coffee, cocoa, chocolate, and alcoholic beverages were entirely avoided. I do not use tobacco. The only exercise taken was that involved in the laboratory work required for the estimations, which, together with other work, amounted in all to about seven hours of laboratory work daily. Seven hours of sleep, the normal personal quota, were taken daily. The total urinary nitrogen—the urea, the uric acid, and the purin bases—were estimated daily during the six days of each period; the total nitrogen was estimated by the Kjeldahl method; the urea by the Mörner-Sjöqvist method; the uric acid by the Salkowski-Ludwig method, as taught by Salkowski, and the purin bases by the new Salkowski method, for which I have only praise to utter. The total urine of the twenty-four hours was always diluted to 2000 c.c. (except when it naturally exceeded that volume), in order to have the determinations conducted under constant comparative conditions. For the estimation of the purin bodies, 1400 c.c. of this diluted urine were mixed with 350 c.c. of magnesia mixture and the phosphates removed by filtration; 350 c.c. of the filtrate were then used for the determination of the uric acid and 1125 c.c. for the bases; thus large quantites were used and the errors of manipulation correspondingly reduced. Since the method for the bases is not yet widely known, I will describe it in its main details: After the phosphates are removed from the urine by the magnesia mixture, the purin bodies, uric acid and the bases, are precipitated as silver-magnesia compounds on the addition of an excess of silver nitrate, and the precipitate kept out of solution by the strongly ammoniated reaction, which at the same time holds the silver chloride in solution. After standing one hour in the dark the gelatinoid precipitate is filtered and carefully washed until free of silver and nearly free of chlorides. It is then washed into a beaker, a few drops of HCl added, and after standing a few moments the silver is precipitated by leading a stream of H_2S through the solution. When this is completed the solution is heated to steaming and the silver sulphide filtered off. The filtrate, which contains the uric acid and the bases, is now evaporated to dryness on the water-bath. When dry, 30 c.c. of a 3 per cent. solution of H_2SO_4 are added, heated to steaming, and then allowed to stand over night. In this acid the uric acid is insoluble, the bases soluble, and thus they are separated. The solution is then filtered and the precipitate well washed with 3 per cent. H_2SO_4. The total filtrate, which contains the bases alone, is then made strongly alkaline by the addition of ammonia, and the bases again precipitated by the addition of silver nitrate. After standing one hour the precipitate is brought upon a fine ash-free filter, previously washed with dilute nitric acid and then with water, and is washed until freed of silver, chlorides, and sulphates. It is then washed with strong alcohol, absolute alcohol, and ether, and then burned in a crucible; the metallic silver is then dissolved in strong nitric acid, and estimated by Volhard's method of titration. Since the quantity of silver is small, a very weak solution of ammonium sulphocyanide should be employed; 1 c.c. of my solution equalled 0.00223 of silver. From the quantity of silver the bases are then calculated by the factor 0.7381, which is derived from the molecular relations in the compounds of the silver with the several bases. This excellent method gives reliable results.

I wish again to emphasize the fact that, except when otherwise stated, tea, coffee, cocoa, chocolate, and alcoholic beverages were excluded from the diet.

PERIOD I. A mixed normal diet, with the avoidance of sweetbreads, liver, and brains. I am naturally a rather heavy eater of proteids and fats. The results are tabulated as follows:

Day	Urine.	Total N.	Urea N.	Per ct.	Urea.	Uric acid.	Bases.	$\overset{+}{U}.:\overline{U}.$	$\overline{U}.:B.$	Total N.: Purin N.
1	1420 c.c.	21.056	19.656	92.4	42.122	0.342	0.0282	123.1 : 1	12.1 : 1	171.8 : 1
2	1350 "	18.116	16.800	92.6	36.000	0.300	0.0233	120 : 1	12.8 : 1	169.3 : 1
3	1280 "	22.484	20.540	91.3	44.014	0.552	0.0189	79.5 : 1	29.2 : 1	118.3 : 1
4	1330 "	22.043	20.256	91.8	43.404	0.402	0.0344	107.9 : 1	11.6 : 1	153 : 1
5	1030 "	20.020	17.936	89.5	38.434	0.279	0.0245	137.7 : 1	11.3 : 1	200.2 : 1
6	1095 "	21.896	18.920	86.4	40.542	0.307	0.0201	132 : 1	15.2 : 1	202.7 : 1
Totals		125.615	114.108	...	244.516	2.182	0.1494			
Averages		20.936	19.018	90.8	40.752	0.364	0.0249	112 : 1	14.6 : 1	162.9 : 1

The body-weight remained constant upon this diet. Uric acid was precipitated from the urine cooled to 20° C. No albumin or sugar were present in the urine.

Period II. The diet of sweetbreads. I ate three times daily one pair of sweetbreads (the thymus and the pancreas of the calf), which varied from 500 to 550 g. for the day. No other animal proteid was eaten, but bread and non-proteid vegetables were taken as in a normal diet; the diet contained about 120 g. of proteid and over 2400 calories of heat. The results are as follows:

Day	Urine.	Total N.	Urea N.	Per ct.	Urea.	Uric acid.	Bases.	$\overset{+}{U}$. : $\overset{-}{U}$.	$\overset{-}{U}$. : B.	Total N.: Purin N.
1	1340 c.c.	20.944	17.920	85.5	38.400	1.413	0.0154	27.1 : 1	86.1 : 1	44 : 1
2	1900 "	29.702	20.454	68.8	43.830	1.540	0.0302	28.4 : 1	50.9 : 1	56.8 : 1
3	1510 "	19.404	17.832	91.8	38.212	0.412	0.0208	92.7 : 1	19.8 : 1	135.7 : 1
4	1250 "	18.816	16.800	89.2	36.000	0.554	0.0293	65 : 1	18.8 : 1	92.2 : 1
5	1220 "	Spoiled	17.360	...	37.200	0.374	0.0287	99.7 : 1	13 : 1	
6	1260 "	18.842	16.081	85.3	34.459	0.937	0.0384	36.7 : 1	24.4 : 1	57.5 : 1
Totals		107.708 129.249[1]	106.447	...	228.101	5.230	0.1628			
Averages		21.541	17.741	82.3	38.017	0.871	0.0271	32.1 : 1	31.9 : 1	72.1 : 1

On the third day of the period diarrhœa set in and continued for three days, accompanied by anorexia, nausea, headache, malaise, and some abdominal pain. The diet was continued unchanged and no drugs were taken. During these three days the quantity of uric acid fell to less than one-third of what it was the first days. On the last day the gastro-intestinal disturbances quieted and a large quantity of uric acid was eliminated. Judging from what we know of the metabolism of nuclein-rich foods, the figures of the first two days represent what the actual effects of such a diet are. The bases were not appreciably altered. What was the explanation of the fall in the uric acid? It was not due to lack of absorption and assimilation of the sweetbreads, since the total urinary nitrogen was maintained. That it was due to a retention there is no evidence. Either the uric acid was transformed into some other substance, possibly urea, or it was eliminated by the bowel; it was not possible to determine which. No albumin or sugar were present in the urine. The symptoms closely resembled those noted in experimental adenin poisoning.

Upon this diet the urine could not hold its uric acid in solution even at the body temperature. Obviously the current use of sweetbreads during convalescence from acute gout as a "light white meat" is not founded upon a knowledge of its properties. Three pounds were lost during this period, probably largely water.

Period III. A heavily proteid diet. In addition to some bread, fruits, green vegetables, and non-proteid desserts, I ate for breakfast six eggs, for luncheon and dinner each a sirloin beefsteak, and at midnight a large portion of cold roast-beef; these contained in all about 200 g. of proteid; the diet contained over 2500 calories. The results were as follows:

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[1] Calculated for the last day from the average.

Day	Urine.	Total N.	Urea N.	Per ct.	Urea.	Uric acid.	Bases.	$\overset{+}{U}$. : $\bar{U}$.	$\bar{U}$. : B.	Total N.: Purin N.
1	1520 c.c.	30.244	28.224	93.3	60.480	0.492	0.0091	122.9 : 1	46.3 : 1	182.1 : 1
2	1380 "	29.380	21.592	73.5	46.267	0.307	0.0329	150.7 : 1	9.3 : 1	277.1 : 1
3	1260 "	29.410	28.252	96.0	60.540	0.351	0.0238	172.4 : 1	14.7 : 1	237.1 : 1
4	1520 "	30.324	26.656	87.9	57.120	0.462	0.0289	123.6 : 1	16 : 1	185.4 : 1
5	1840 "	32.802	30.996	94.5	66.420	0.414	0.0201	160.4 : 1	20.6 : 1	227.7 : 1
6	1930 "	31.240	29.540	94.5	63.300	0.713	0.0193	88.7 : 1	36.9 : 1	149.4 : 1
Totals		183.400	165.260	...	354.127	2.739	0.1341			
Averages		30.566	27.543	90.1	59.021	0.456	0.0223	129.3 : 1	20.4 : 1	192.4 : 1

The diet agreed perfectly, and three pounds were gained in weight. The average urinary nitrogen, over 30 g., is an index of the excess of proteid in the diet, and likewise illustrates the Pflueger law of the assimilability of proteids. It is often stated that five pounds of meat per day may be easily eaten, and that some Indians can eat ten pounds in a day I know; for myself, however, the quantity in the above diet is the maximum. No albumin or sugar were in the urine.

Period IV. A purely vegetable diet, which contained no milk or eggs, nor was any animal fat used in the process of cooking. Incidentally remarked, it is the eggs, milk, and animal fats which are the salvation of so-called vegetarians; without them the diet is very bulky and also revolting. Naturally, a large quantity of pease and beans are required, to provide the necessary proteid, and they were both eaten, with large quantities of bread, three times daily, together with many other vegetables and nuts. The results were as follows:

Day	Urine.	Total N.	Urea N.	Per ct.	Urea.	Uric acid.	Bases.	$\overset{+}{U}$. : $\bar{U}$.	$\bar{U}$. : B.	Total N.: Purin N.
1	1080 c.c.	11.956	10.976	91.8	23.520	0.509	0.0165	46.2 : 1	30.8 : 1	68.7 : 1
2	1140 "	11.802	10.968	92.9	23.502	0.402	0.0157	58.4 : 1	25.6 : 1	84.9 : 1
3	1340 "	12.264	11.312	92.2	24.240	0.343	0.0230	70.6 : 1	14.9 : 1	101.3 : 1
4	1610 "	12.236	11.352	92.9	24.325	0.579	0.0256	42 : 1	22.6 : 1	60.8 : 1
5	980 "	11.382	10.248	90.0	21.960	0.501	0.0215	43.5 : 1	23.4 : 1	65.4 : 1
6	990 "	11.606	10.752	92.6	23.040	0.434	0.0148	53 : 1	29.2 : 1	77.8 : 1
Totals		71.246	65.608	...	140.587	2.771	0.1171			
Averages		11.871	10.934	92.0	23.430	0.462	0.0195	50.7 : 1	23.6 : 1	74.2 : 1

The ingestion of the maximum quantity of vegetables was not sufficient to furnish more than 12 g. of urinary nitrogen, which would correspond to about 90 g. of proteid in the diet. That this is sufficient for the needs of a body of this weight is accounted for by the fact that the diet contained an excess of carbohydrates, representing over 3000 calories, and we know that an excess of carbohydrates enables a body to economize upon its proteid metabolism. The body-weight was constant. The cooled urine at 20° C. precipitated no uric acid, which was in marked contrast to the precipitation noted in the other diets. No albumin or sugar were excreted.

Period V. A milk diet. The milk was a modified milk obtained from the Walker-Gordon laboratory; 2750 c.c. were taken daily; it contained a little over 4 per cent. of proteids, 120 g. of proteids, and 6 per cent. each of sugar and fats, thus corresponding to about 2700 calories. The results were as follows:

Day	Urine.	Total N.	Urea N.	Per ct.	Urea.	Uric acid.	Bases.	$\overset{+}{U}$. : $\overset{-}{U}$.	$\overset{-}{U}$. : B.	Total N.: Purin N.
1	1845 c.c.	17.668	16.660	91.1	35.700	0.289	0.0088	123.5 ; 1	32.8 : 1	177.1 : 1
2	1105 "	18.421	17.792	96.5	38.125	0.250	0.0109	152.4 : 1	22.9 : 1	211.7 : 1
3	1260 "	17.721	16.408	92.5	35.160	0.236	0.0115	149 : 1	20.5 : 1	216.4 : 1
4	1210 "	18.862	17.920	95.0	38.400	0.308	Lost	124.6 : 1		
5	1330 "	17.808	16.432	92.2	35.211	0.293	0.0114	120.1 : 1	25.7 : 1	176.3 : 1
6	1110 "	17.042	16.184	94.9	34.680	0.329	0.0135	105.4 : 1	24.3 : 1	152.1 : 1
Totals[1]		107.528	101.396	...	217.276	1.705	0.0561 [1]0.0673			
Averages		17.921	16.899	91.3	36.213	0.284	0.0112	127.5 : 1	25.3 : 1	182.6 : 1

This diet agreed perfectly in every particular. At no time was uric acid precipitated from the urine cooled to 20° C. No albumin or sugar were present in the urine.

Period VI. A nitrogen-free diet. Such a diet was composed of 350 g. of pure sago, 50 g. of sugar, and 100 g. of butter per day. The sago was a manufactured product, and contained on analysis but 0.069 g. of nitogren in the daily ration. The butter contained, on an average of four analyses, 0.125 g. of nitrogen in the daily ration; the sugar contained none; thus the entire daily ration of carbonous food contained less than 0.200 g. of nitrogen; it represented over 2500 calories. This diet was fully sufficient to supply the heat of the body, but for its nitrogenous metabolism the body was thrown entirely upon its own tissues; it was to determine the actual nucleinic output under such conditions that the diet was undertaken. The results were as follows:

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[1] Calculated for the last day from the average.

Day	Urine.	Total N.	Urea N.	Per ct.	Urea.	Uric acid.	Bases.	$\overset{+}{\mathrm{U}}. : \overline{\mathrm{U}}.$	$\overline{\mathrm{U}}. : \mathrm{B}.$	Total N.: Purin N.
1	1810 c.c.	5.432	4.116	75.7	8.820	0.307	0.0065	28.7 : 1	47.2 : 1	52.2 : 1
2	1510 "	4.578	3.916	85.5	8.391	0.401	0.0050	20.7 : 1	80.2 : 1	33.9 : 1
3	1440 "	4.102	3.560	86.7	7.627	0.241	0.0060	31.2 : 1	40.1 : 1	50 : 1
4	1560 "	4.162	3.552	85.3	7.611	0.271	0.0081	28 : 1	38.4 : 1	44.7 : 1
5	1300 "	4.228	3.276	77.4	7.020	0.227	0.0076	30.9 : 1	30 : 1	56.3 . 1
6	1310 "	3.780	3.248	85.9	6.960	0.189	0.0068	36.8 : 1	27 : 8	58.1 : 1
Totals		26.282	21.668	...	46.429	1.636	0.0400			
Averages		4.380	3.611	82.4	7.738	0.273	0.0066	28.3 : 1	41.3 : 1	47.1 : 1

About six pounds were lost during this period of eight days, during which the bowels moved but twice. The diet caused very little digestive disturbance, but toward the close of the experiment there was a distinct loss of strength. Neither sugar nor albumin appeared in the urine, which was almost colorless, and held all its uric acid in solution when cooled to 20° C.

This experiment shows how the body will economize in its nitrogenous metabolism. In the various studies of the urine during starvation the output of urinary nitrogen has usually been double that present in this experiment; obviously the carbonous food shielded the tissues to that extent. While the diet cannot be called a physiological one, the figures probably represent the minimum nitrogenous metabolism. When we compare the figures here obtained with those afforded by the heavily proteid diet, where *seven* times as much urinary nitrogen was eliminated, we perceive the wide latitude of adaptability which our nitrogenous metabolism possesses, and which is in such marked contrast to the limited range of the carbonous metabolism.

Following the period of nitrogen-free diet a long rest was taken, and the next experiment was not begun until the body had recovered the lost weight. In this period (VII.) a normal diet was taken, the same as in the first period, but with the addition of three cups of coffee per day—one large cup at breakfast and a small cup of *café noir* at luncheon and dinner. Two bottles of beer were taken daily, about 0.700 l. The results were as follows:

Day	Urine.	Total N.	Urea N.	Per ct.	Urea.	Uric acid.	Bases.	$\overset{+}{U}$. : $\bar{U}$.	$\bar{U}$. : B.	Total N.: Purin N.
1	2515 c.c.	16.908	15.682	92.7	33.604	0.703	0.0506	47.8 : 1	13.9 : 1	67.9 : 1
2	1280 "	19.908	18.312	91.9	39.240	0.793	0.0461	49.3 : 1	17.2 : 1	71.6 : 1
3	2220 "	22.284	18.396	82.5	39.420	0.666	0.0555	59.2 : 1	12 : 1	93.2 : 1
4	1560 "	22.144	19.696	88.9	42.205	0.790	0.0530	53.4 : 1	14.9 : 1	79.3 : 1
5	1290 "	22.372	20.216	90.3	43.320	0.808	0.0556	53.6 : 1	14.5 : 1	78.2 : 1
6	1280 "	21.168	19.516	92.1	41.820	0.568	0.0656	71.8 : 1	8.6 : 1	101.2 : 1
Totals		124.784	111.818	...	239.609	4.328	0.3264			
Averages		20.797	18.636	89.6	39.935	0.721	0.0544	55.4 : 1	13.2 : 1	80.9 : 1

The striking increase in the uric acid and bases is the only thing noted in the results. Since both beer and coffee entered into the diet, another period (VIII.) was carried through, in which, with the same diet and a little more coffee, no alcoholic beverage was taken. The results were as follows:

Day	Urine	Total N.	Urea N.	Per ct.	Urea.	Uric acid.	Bases.	$\overset{+}{U}$. : $\bar{U}$.	$\bar{U}$. : B.	Total N.: Purin N.
1	1590 c.c.	18.480	16.576	89.6	35.520	0.942	0.0721	37.4 : 1	13 : 1	55 : 1
2	1100 "	18.352	17.296	94.2	37.062	0.953	0.0515	38.9 : 1	18.5 : 1	55.6 : 1
3	2100 "	19.012	17.612	92.6	37.740	0.821	0.0791	45.9 : 1	10.3 : 1	63.3 : 1
4	1610 "	21.840	19.516	89.2	41.820	0.657	0.0622	63.6 : 1	10.5 : 1	91.7 : 1
5	1325 "	22.176	20.095	90.6	43.060	0.821	0.0683	52.4 : 1	12 : 1	76.1 : 1
6	1860 "	20.396	18.732	91.9	40.182	0.765	0.0578	52.9 : 1	13.2 : 1	74.9 : 1
Totals		120.256	109.827	...	235.384	4.959	0.391			
Averages		20.043	18.304	91.3	39.225	0.826	0.0651	47.4 : 1	12.6 : 1	68 : 1

The following table contains a comparative summary of the average results:

Diet..	Total N.	Urea N.	Per ct.	Urea.	Uric acid.	Bases.	$\overset{+}{U} : \overline{U}.$	$\overline{U}. : B.$	Total N.: Purin N.
Normal	20.936	19.018	90.8	40.752	0.364	0.0249	112 : 1	14.6 : 1	162.9 : 1
Sweetbread	21.541	17.741	82.3	38.017	0.871	0.0271	43.6 : 1	32.1 : 1	72.1 : 1
Heavy proteid	30.566	27.543	90.1	59.021	0.456	0.0223	129.3 : 1	20.4 : 1	192.4 : 1
Vegetable	11.874	10.943	92.0	23.430	0.462	0.0195	50.7 : 1	23.6 : 1	74.2 : 1
Milk	17.921	16.899	94.3	36.213	0.284	0.0112	127.5 : 1	25.3 : 1	182.6 : 1
Carbonous	4.380	3.611	82.4	7.738	0.273	0.0066	28.3 : 1	41.3 : 1	47.1 : 1
Normal, with coffee and beer	20.797	18.636	89.6	39.935	0.721	0.0544	55.4 : 1	13.2 : 1	80.9 : 1
Normal, with coffee alone	20.043	18.304	91.3	39.225	0.826	0.0651	47.4 : 1	12.6 : 1	68 : 1

SUMMARY OF RESULTS. In all the experiments, except in VI., the total urinary elimination of nitrogen corresponds with the input. This nitrogen represents the common proteid metabolism of the body, and has absolutely no constant relations to the nucleinic metabolism. This is a fact of fundamental importance. The common nitrogenous metabolism is a process of low specialization, and produces a large amount of output in the form of urea and ammonia. The nucleinic metabolism is a highly specialized process which produces a small output of uric acid and purin bases. When these distinctions are clearly understood, when we realize that each of these may be increased or decreased independent of the other, when we perceive their factive independence, we will understand how worthless are the ratios based upon a comparison of their results, as the urea-uric acid ratio. I will return to this point.

The figures for urea are very interesting, inasmuch as they differ notably from the figures commonly observed in diet experiments. The urea constitutes in my case a much higher percentage of the total nitrogen than is usual. Upon the normal diet of the first period the average was 90.8 per cent.; it fell to 82.3 per cent. upon the abnormal sweetbread diet; upon the heavily proteid diet it was 90.1 per cent.; upon the vegetable diet, 92 per cent.; it rose to 94.3 per cent. upon the milk diet, fell to 82.4 per cent upon the carbonous diet, and upon the two last diets was respectively 89.6 per cent. and 91.3 per cent. The average for the physiological diets was, therefore, 91.3 per cent. of the total nitrogen, which is about 5 per cent. above the figures usually seen. A partial explanation may lie in the fact that the total nitrogen was more than usual; in most of the work from 16 to 17 g. of nitrogen constituted the output; here the average in the physiological diets was over 20 g.; since the difference is most largely in the urea, this might explain the higher percentage. The fact, however, that the highest figure was seen in the milk diet—94.3 per cent.—and not in the heavily proteid diet—90.1 per cent.—excludes such an explanation. The cause must lie in an individual peculiarity of metabolism; there was more urea and less ammonia and kreatinin eliminated simply because that was the habitus of the individual metabolism.

The uric acid was lowest, during the periods of a natural diet, upon the milk diet, the average being 0.284 g. per diem. It was very little less upon the carbonous diet—0.273 g.—so that these figures may be taken to represent the actual extent of essential nucleinic metabolism. Upon a normal diet (I.) the uric acid was 0.364 g. This increase over a milk diet may be conceived as the result either of the ingestion in the diet of nucleins which appear as uric acid, or of a stimulation of the nucleinic metabolism by something in the diet; the first explanation seems to-day the more probable. Upon a heavily proteid diet the uric acid rose to 0.456 g., nearly a hundred milligrammes over the quantity from a diet similar, except for the excess of proteid. Upon a purely vegetable diet the uric acid was still a little higher than upon the heavily proteid diet, 0.462 g. When we consider that in a vegetable diet we are compelled to include a large quantity of seeds (pease and beans and nuts), in order to procure the necessary proteid, and that these seeds are rich in nucleins, the high figures for uric acid are only the natural and expected results.

The average, 0.871 g., for the sweetbread diet is misleading, on account of the complication of diarrhoea during the third, fourth, and fifth days. An average of the other three days, 1 260 g., represents the output more accurately. The excess is due to the large quantity of nucleins in sweetbreads, which are eliminated as uric acid.

When coffee and beer were added to a normal diet (VII.) the uric acid rose to 0.721 g.—just double the figure seen upon a normal diet without coffee and beer (I.). This excess was probably due entirely to the fact that the nucleins in coffee and beer are eliminated in part as uric acid. Caffeine is, as we know, a purin base, and we would expect it to increase the purin bodies in the urine. In order to eliminate the factor of the beer, this was excluded in diet VIII. and a little more coffee added; the uric acid rose still higher—to 0.826 g. per diem. Apparently the beer had little influence. It is therefore apparent that in connection with the use of coffee the elimination of uric acid may be more than doubled, and that in ordinary life more than half of our uric acid may come not from our food, nor from our tissues, but from our beverages. That fact, of course, does not show in the least that those beverages are bad; it must be first shown that the uric acid which results from them is harmful.

The failure of a heavy meat diet to exaggerate the elimination of uric acid is contrary to the time-honored English theories, and yet it is what a careful consideration would lead us to expect. Muscular tissue is not rich in nucleins, and, so far as we know, it is only from nucleins and purin compounds in the diet that uric acid can be derived dietetically. The output of uric acid upon the vegetable diet is, of course, a heretical performance, but nevertheless one in direct harmony with the nucleinic richness of the pease and beans which must form so large a part of a vegetable diet.

These figures demonstrate again the comparative (and for clinical purposes, complete) worthlessness of the urea-uric acid ratio, the sacred $\overset{+}{U} : \overset{-}{U}$ of our books. Upon a normal diet (I.) it was 112.1. Upon a sweetbread diet, where the uric acid was much increased and the urea but little affected, it was 43.6 : 1. Upon the heavily proteid diet the urea was much increased and the uric acid but little, so the ratio rose to 129.3 : 1. Upon the vegetable diet, where the uric acid was somewhat increased and the urea markedly diminished, the ratio was 50.7 : 1. Upon the milk diet, where the uric acid was low and the urea high, it was 127.5 : 1—almost identical with the ratio seen in the heavily proteid diet. Upon the nitrogen-free diet (VI.) both the uric acid and the urea were low, the latter, however, much the most, and the ratio was 28.3 : 1. This was the only experiment in which I reached the gout-ratio of Haig. In these experiments the more proteid eaten the further from the gout-ratio was the $\overset{+}{U} : \overset{-}{U}$; when no proteid was eaten the gout-ratio was attained. The ratios during the last two periods with coffee, 55.4 : 1 and 47.4 : 1, are about the normal figures usually quoted. When they are contrasted with those seen upon a normal diet, 112.1, the striking results of the coffee are seen. In view of the wide currency of Haig's views, it seems necessary to emphasize the necessary conclusions from these figures. Since we know that the urea is influenced largely by the quantity of proteid in the diet and by the proteid metabolism; that the plain proteid has little influence upon the nucleinic metabolism or the elimination of the purin compounds; and that the nucleinic metabolism and the substances which affect it, and the elimination of the purin bodies, have little effect upon the urea formation, it must follow that the urea-uric acid ratio is almost valueless, and, as a basis of pathological reasoning as it is employed in current clinical medicine, entirely worthless.

The average amount of purin bases eliminated upon a normal diet (I.) was 0.0249 g. During the sweetbread diet (II.) there was but little change, the average being 0.0271 g., a slight increase, but one of no moment. Apparently all the nucleins in this diet passed into uric acid. Upon a heavily proteid diet (III.) the average figure was 0.0223 g. per day, a slight reduction below the average of the first period, but one too small to be of any importance. Upon the vegetable diet (IV.) the average of bases fell still lower—0.0195 g.—though only to a slight degree. I believe the averages in the first four periods represent the normal averages for these bases, and that the slight fluctuations are those connected with the normal nucleinic metabolism, and that they are too slight to have had any reference to the diet. The first decided change is seen in the figures obtained as the average for the period of milk diet (V.), 0.0112 g.—less than one-half the amount seen in the first period. Upon the carbonous diet of the next period (VI.) the bases fell still lower—to 0.0066 g. These last two averages, with the figures for the uric acid during the same periods, probably represent the absolute metabolic production of the purin substances in this particular organism. So soon as coffee and beer were added to a normal diet, as in period VII , the quantity of bases rose to 0 0544 g. per day—over twice as large as the average for the periods I., II., III., IV., five times the quantity eliminated on a milk diet, and nine times the quantity passed during period VI. of the carbonous diet. In period VIII., when the beer was withdrawn, the bases rose even a little higher—to an average of 0.0651 g. per day, or three times as much as was eliminated upon the same diet (period I.) without the coffee. Obviously caffeine (a purin base) has been eliminated as a purin base. These figures confirm the findings of Krüger and Salomon, who in the study of a hundred grammes of purin bases obtained from human urine, found that less than one-third came from the metabolism, while over two-thirds belonged to the homologous series, and were derived from xanthins ingested with the diet. In all work upon the pathological relations of the purin bodies the metabolic and the dietetic bases must be kept constantly separated.

The ratios between the uric acid and the bases are interesting but not notably valuable. During the first period this ratio was 14.6 : 1. The sweetbreads during the next period increased the uric acid, but had little effect upon the bases, so the ratio rose to 32.1 : 1. Upon the heavily proteid diet the ratio was 20.4 : 1 ; upon the vegetable diet almost the same, 23.6 : 1. Upon the milk diet the ratio was 25.3 : 1, while on the carbonous diet the ratio was 41.3 : 1. Thus we see that upon different physiological diets this ratio may vary from 14 : to 25 : 1. The excess of the bases noted during the last two periods reduced the ratio to 13.2 : and 12.6 : 1 respectively. That this ratio expresses little bearing upon the nucleinic metabolism is shown by the following comparison : During period I. the ratio was 14.6 : 1 ; during period VII. the ratio was 13.2 : 1, or almost the same ; yet during period VII. about double the amount of both uric acid and the bases was eliminated as during period I. Since certain diets and the use of certain substances may increase the elimination of both uric acid and the bases, or of uric acid alone, or of the bases alone, the simple ratio between uric acid and the bases furnishes little information relative to the nucleinic metabolism, or even to the simple excretion of the substances.

The ratios of the total nitrogen to the purin-nitrogen are subject to about the same considerations which pertained to the $\overset{+}{U} : \overset{-}{U}$ ratio. The total nitrogen depends upon one set of conditions, the purin-nitrogen depends upon another distinct set of conditions, and a comparison of two independent functions gives little evidence of the state of either. Upon the normal diet, the heavily proteid diet, and the milk diet the ratios were not far separated—162.9 : 1, 192.4 : 1, and 182.6 : 1 respectively; yet how different the metabolism during the three periods. During the vegetable diet, and during the last two diets with coffee, the ratios were, roughly, the same—74.2 : 1, 80.9 : 1, and 68 : 1 respectively—yet how different the metabolism and the urinary excretions! The urine of the carbonous diet gave the ratio of 47.1 : 1, yet during this period the total quantity of the purin bodies was nearly as large as it was during the period of milk diet, in which the ratio was 182.6 : 1.

I trust that thse considerations may in some measure emphasize in an adequate manner the distinctions between the common nitrogenous and the nucleinic metabolisms, distinctions well known to physiologists, and due largely to the work of the Kossel school. These two aspects of metabolism must be studied separately; when relations between them become established we will have occasion to use a $\overset{+}{U}\text{-}\overset{-}{U}$ ratio in a proper and scientific manner, which to-day we have not.

These results are not to be viewed as anything more than physiological facts. They have, so far as I can see, no bearing upon the pathology of gout. My chief aim has been to determine, I believe for the first time by accurate methods, the influence of diets upon the elimination of the purin bases, and to learn whether any constant relationship exists between them and the uric acids.

PYOCYANEUS BACILIÆMIA.

A CRITICAL REVIEW OF THE RECORDED CASES, WITH THE REPORT OF A CASE SECONDARY TO A STAPHYLOCOCCÆMIA.

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A number of instances of systemic invasion by the bacillus pyocyaneus have been reported in the last few years, and quite an extensive literature has accumulated on the subject. It is unnecessary here to detail the entire literature, as it is so completely given in many of the recent articles. The case which forms the basis of this paper is an instance of a general invasion by the bacillus pyocyaneus secondary to one by the staphylococcus aureus. Before giving the details of this case it may be advisable to give a sketch of what is known of the clinical course of pyocyaneus infections in general in man. This is well summed up by Lartigau, in his recent article, part of which we shall abstract.

"The clinical evolution of the infection in man resembles in a general manner the other better known forms of septicæmia and some of the acute febrile diseases. The general symptoms at the onset are those of an infectious disease—weakness, prostration, and fever. The temperature is usually high; it does not run a characteristic course. Occasionally there is pulmonary disturbance, sometimes broncho-pneumonia and pleurisy. Epistaxis has been observed, and tympanites is present, as a rule. The spleen is enlarged; the urine sometimes contains small amounts of albumin. Intestinal disturbances occur with great frequency, especially in the form of a diarrhœa which shows nothing characteristic except that, at times, the movements are more or less greenish and occasionally blood-stained. The acute enteritis may come on quickly after the onset of the disease, and persist until death, or it may disappear. In other cases it appears much later in the disease. Vomiting is frequent, and the vomited matter is sometimes bloody. Cutaneous manifestations are very frequent, and appear in the form of either bullous eruptions or petechiæ and more rarely as a papular rash. The eruption generally appears on the trunk, limbs, and scrotum, and the time of its appearance is variable, in some cases being late and in others early. Death occurs in forty-eight hours to four or five days, in a few cases later.

"The post-mortem examination shows vasomotor disturbances, focal necroses, hemorrhages, lesions of the parenchyma of the heart, liver, spleen, and kidneys. Intestinal lesions are common, and show a predilection for the small intestine. There may be superficial necrosis, diffused or circumscribed. Ulcers form in the less acute cases, but rarely involve more than the mucous membrane. There may be an acute hemorrhagic enteritis."

Charrin, in his first communication, in 1889, on experimental work on animals with the bacillus pyocyaneus, found that rabbits were more susceptible than guinea-pigs, doves, or frogs. In rabbits he distinguished four types of cases—the hyperacute, lasting twenty-four hours; the acute, two to four days; the subacute cases lasted one to three weeks, and the chronic several months. The symptoms were malaise, somnolency, convulsions, fever, diarrhœa, and albuminuria. In the chronic cases there was much loss in weight. After five days to two months the animals developed marked spastic paralysis, especially of the hind legs. The bacilli could be recovered from the bloody stools and the urine.

Pathologically there was found an enteritis, hemorrhages in the stomach and cæcum, infarctions and amyloid degeneration, occasionally contracted kidneys, and hypertrophy of the heart. All these changes except the infarcts could be produced by the intravenous injection of the culture-products, and immunity could be obtained in the same way.

The nervous symptoms described by Charrin in animals have not been noted particularly in man, except in one case reported by Jadkewitsch. This man had a chronic eczema of both legs. During ten years, at three different times, there developed suppurating ulcers, which always discharged blue pus. On each of these occasions nervous symptoms developed. The first time the suppuration lasted three months, and there developed paralysis and anæsthesia of the right arm. Five years later it lasted three weeks, and again nervous symptoms appeared which persisted for four months. After three years it returned and again lasted four months; the patient then suffered from diarrhœa, paralysis of both legs, and sensory disturbances, which spread to the scrotum, penis, and the gluteal and anal regions. The urine at that time showed pyocyaneus bacilli.

The history of our case is as follows:

W. K., aged twenty-three years, newsdealer, admitted to the Mt. Sinai Hospital, July 6, 1898.

Family History. Father died of tuberculosis; brothers and sisters are healthy.

Previous History. Has slight alcoholic habit; no tobacco habit. Two years ago he went to a dispensary for headache, and was told that he had kidney disease. Since then he has not had headache nor any other symptoms.

Present History. He has been ill for two weeks and confined to bed for the past eight days. He first suffered from headache, nausea, and constipation, which increased in severity. The nausea has become quite constant, but there is no vomiting. He has had constant fever without chills. The prostration has grown very marked. He has had indefinite pains over the heart region and in the extremities, and says that he has been getting jaundiced for the past three weeks. The stools have been yellowish and generally fluid. There has been no pain, except over the left chest. He has no sweating; there is no cardiac palpitation. His urine is dark colored, and he passes increased quantities.

Physical Examination. Muscular development is poor, and there is little adipose tissue. Skin icteric and moist. Pulse 100; arteries tortuous and sclerotic, their tension not increased. Physical examination: Lungs negative. Cardiac dulness extends from the left border of the sternum to one inch to the right of the nipple line. Auscultation negative. Liver not enlarged. There is tenderness along the free border. The spleen is obscured by tympanites. Respiration 24, pulse 100, temperature 100 to 100.2°.

July 7th. Urine acid, 1010; no albumin; no sugar. Temperature 100.8° to 102.5°. Examination of the blood shows no leucocytosis.

8th to *12th.* The temperature ranged between 98.6° and 104.5°. On the latter date one of the veins in the left arm was aspirated and 5 c.cm. of blood used for making cultures on agar and bouillon.

13th. Temperature 99°. The jaundice is less marked and the abdominal pain has disappeared. The stools continue to be irregular, yellow, or clay-colored.

14th. Temperature 98.4° to 101°. The blood cultures show a staphylococcus which, after a few days, develops a slightly golden color.

15th. Temperature 99° to 102°. The jaundice has almost entirely disappeared.

17th. Temperature 98.6° to 100°.

18th. Patient allowed to be up out of bed. Temperature the same.

19th and *20th.* Temperature the same. Patient complains of pain in the lower part of the left thigh, on the outer side, and examination reveals a point of tenderness in the lower part of the left vastus externus muscle. The muscle feels tense in that area.

From the *21st* to the *26th* the temperature varied from 98.4° to 103°. The pulse rose to 120. Examination of the blood shows white blood-cells, 5625; red blood-cells, 900,000; hæmoglobin, 20 per cent.

30th. Pulse 130. A distinct tender swelling, about 4 cm. in diameter, can be felt in the left vastus externus muscle. An examination of the blood shows a marked diminution in the number of the red blood-corpuscles, with a high hæmoglobin coefficient. There is great variation in the size and shape of the red cells, there being numerous megalocytes and microcytes. No nucleated reds can be found. The white blood-cells are not increased in number.

31st. Temperature 99.5° to 103°. Patient kept in bed. The cervical, axillary, and inguinal glands are enlarged, and there is considerable œdema about the eyes. There is tenderness of the sternum.

August 2d. Temperature the same; jaundice more marked. Vomited a quantity of light yellow fluid twice. Spleen enlarged to percussion; not palpable.

3d. Temperature 100 to 106.6°, pulse 140, respirations 40.

4th. Temperature 103° to 104°; frequent vomiting.

5th. Jaundice increasing. Temperature 107°; respirations 45; pulse 155. Vomited several times. Had a chill at 9 A.M., one at 3.30 P.M., and one at midnight. Scattered over the body are numerous small areas of blackish-brown pigment, especially on the face, neck, arms and legs. They vary in size from a pin-point to three-sixteenths of an inch in diameter. There are none on the mucous membrane. The liver is enlarged and tender. The first heart-sound is very loud, the second sound poor. In the morning a blood culture was made, using 6 c.cm. of blood. In eight hours there was a profuse growth of the bacillus pyocyaneus. In the afternoon the patient was seized with tonic convulsions, with staring, glassy eyes. The attack lasted about two minutes, and after that the body was rigid.

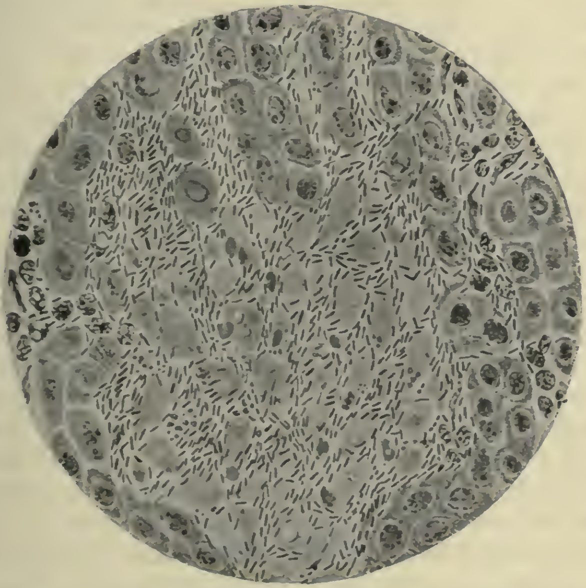
6th. Chill at 6 A.M., lasting ten minutes. Later the pulse became very weak, and there was some twitching of the limbs and body. He was quite rigid at intervals. The pulse rapidly became imperceptible, and the patient ceased breathing at 9 A.M., the temperature being 103.5°.

Post-mortem Examination. Made five hours after death. Mucous membranes very pale, with yellowish tint. Sclerotics yellowish. Small patches of black pigment on various parts of the body. General glandular enlargement.

Heart. Muscle fatty; left ventricle dilated; the mitral valves show some thickening of the free edge of the flaps (relative insufficiency). *Lungs* negative. *Spleen* very large; some fresh fibrin on surface; color grayish; numerous hemorrhagic spots the size of a pin-head. *Liver* very large, congested, soft; shows irregular, yellow markings, especially in the form of rings, around the vessels. *Kidneys* congested; capsules not adherent; on cut section are firm, somewhat granular, markings indistinct. *Adrenals* small; medulla looks whitish.

In the left vastus externus muscle is a small abscess, about 4 cm. in diameter, containing yellowish pus and surrounded by hard, infiltrated muscle-tissue. The other organs could not be examined.

Microscopical Examination. The liver shows intense, acute degenerative changes, with necrosis in spots; marked yellowish and brownish pigmentation. In many places the tissue cannot be recognized at all. The interstitial connective tissue is increased in amount, and there is a marked recent proliferation of round cells. The vessels are dilated, and in their walls are myriads of bacilli, which are also found packing the capillaries and lying in veritable colonies in the necrosed tissue. (See figure.) Some parts show a more marked invasion. *Spleen.* Capsule thickened; connective tissue increased. There is very intense degeneration and necrosis, and marked yellowish-brown pigmentation, especially of the more degenerated tissue. Scattered throughout the spleen are very many bacilli, which in some places are gathered in large numbers. *Kidneys.* The cells of the tubules are swollen and granular; some are desquamated, and there is much granular material in the lumen. The capillaries of the Malpighian bodies are dilated, and the



Zeiss objective, $^1/_{12}$ homog. immersion, ocular 6—showing marked invasion of liver by pyocyaneus bacilli.

cells lining Bowman's membrane are swollen and the cells over the capillaries increased in number. The connective tissue is increased in amount and looks œdematous. There is a fairly large number of bacilli present in the interstitial tissue. *Adrenals* show intense acute degeneration, especially in the medulla; many of the cells show vacuoles; in some only an indistinct nucleus can be seen; in others it has disappeared. The vastus externus muscle shows typical changes of abscess formation.

Bacteriological Examination. Cultures from the liver, spleen and kidneys showed a very marked growth of the bacillus pyocyaneus. Cultures from the abscess in the vastus externus muscle gave a growth of staphylococcus aureus.

Post-mortem Diagnosis. Parenchymatous degeneration and necrosis of the liver and spleen; chronic interstitial nephritis; acute nephritis and degenerative atrophy of the adrenal bodies. Metastatic staphylococcus abscess of vastus externus muscle; general pyocyaneus infection.

SUMMARY OF CASE. As narrated above, the patient was sick six weeks, for four weeks of which time he was in the hospital. He came in with jaundice, irregular fever, and prostration, and presented the picture of an infectious icterus. A diagnosis of septicæmia was made (with unknown portal of infection), and the blood culture, revealing the staphylococcus aureus, confirmed this view. After two weeks the jaundice had entirely disappeared, the temperature approached normal, and the patient was so much improved that he was allowed to be up. At this time his skin was of a pale lemon color, and he presented the clinical picture of a pernicious anæmia. The blood examination corroborated this. It is of interest to note the absence of any leucocytosis, although the anæmia was a secondary one. Then the patient developed symptoms of a metastatic abscess in the vastus externus muscle, and the temperature rose somewhat. Later the jaundice and other symptoms returned, and the fever became very high and the liver enlarged. A blood culture now revealed the bacillus pyocyaneus, the rapid growth pointing to a marked infection. The temperature then rose very high, and the patient died with marked nervous symptoms. The cultures made at the autopsy from the abscess showed staphylococcus aureus, confirming the first culture, made *intravitam*, and the organs all showed the bacillus pyocyaneus in enormous numbers. In short, then, we had before us a case of staphylococcæmia, with a single metastasis in a muscle—by itself a very unusual occurrence. This was then followed by the pyocyaneus invasion. The point of entry is unknown. Had a more complete autopsy been permitted it is of course possible that one might have been found. Undoubtedly the chronic nephritis predisposed the patient to bacterial invasions, and the case as a whole may in a way be considered as possibly belonging in the class of terminal infections. There are several points in connection with the case worthy of further note.

1. The great value of the blood culture in deciding the diagnosis. The case at first resembled those which have been described as due to infections by the bacillus proteus fluorescens (Weil's disease), and it is evident how important it is in these cases of infectious jaundice to examine for the infecting organism. Without the blood culture we should have been in the dark as to the diagnosis until the muscle abscess made its appearance.

2. The enormous number of bacilli in the liver and spleen, and the very marked changes found in connection with them, allow us to exclude the possibility of there having been a mere agonal invasion. (See plate.) We are inclined to believe that the pyocaneus invasion occurred at least several, probably six days, ante-mortem, when the temperature became high for the second time.

3. The pigmentation of the skin is of special interest. Various eruptions have been described in connection with infections by the bacillus pyocyaneus, mostly bullous, papular, and hemorrhagic. Our case is the first in which pigmentation such as is found in Addison's disease has been met with. We are not inclined to believe that this is due to the bacillus pyocyaneus *per se*, but to the effects of its toxins (and those of the staphylococcus) in causing the degenerative atrophy of the adrenal bodies. Such a change has been met with in connection with typical Addison's disease. Thus, Neusser (*Erkrankungen der Nebennieren*, 1897, p. 33) says: "In a large number of cases simple or inflammatory atrophy of the adrenal bodies has been advanced as the cause of Addison's disease."

4. A careful consideration of the reported cases of systemic pyocyaneus infections and of our case must bring up the question whether these infections are ever primary. This is a question which is very difficult of solution. A very large number of the cases reported occurred secondarily to or at the same time with an infection by other bacteria, or toward the end of some chronic disease. It is possible that many of the cases which are recorded as pure infections were not such, and that they followed an infection by some other micro-organism, which was then overgrown or displaced. This is especially probable, as in practically all the reported cases the bacteriological examination was first made late in the disease or at the post-mortem examination.

5. If we look over the literature up to date we find that all the cases in which the bacillus pyocyaneus has been found can be arranged in three classes.

A. *Those in which the bacillus was found during life or post-mortem in the gastro-intestinal canal, or in abscesses or exudates having a direct or indirect communication with the open air.* These cases are very numerous; thus, it has been found in skin eruptions, fistula in ano, in the discharge of otitis media cases, in the urine, in dysentery, in chronic mastitis, in abscesses of the ovaries, etc. In these cases the infection occurred from outside the body.

B. *Those in which it was found during life in abscesses or exudates not in direct communication with the open air.* These cases are the following: Ernst isolated a variety of pyocyaneus from an exudate in the pericardium by tapping; the tubercle bacillus was also present. (The significance of this observation is somewhat lessened, as the fluid which was examined was removed at a second tapping done seven days after the original aspiration.)

Schürmayer found the bacilli in the exudate in a bursa in front of a knee-joint. The fluid was light yellowish in color; there was no constitutional reaction.

In this second class of cases we must think of the possibility of an infection by way of the blood or lymphatics.

C. *Those in which there is claimed to have been an undoubted general invasion by the bacillus, or, in other words, a pyocyaneus bacillæmia.* Many of the cases reported in this group are doubtful, as the bacteriological reports were made from post-mortem work. It has been repeatedly brought out of late years (particularly by Chvostek and Egger) how careful we must be to give the correct significance to the post-mortem invasions of bacteria, especially of such motile bacteria as the colon bacillus and the bacillus pyocyaneus. As Fischl well puts it: "The only way in which we can find out whether the post-mortem findings mean anything or not is to examine the organs microscopically and see if we can find a direct relation between the bacteria present in them and the changes in the tissue, so that we can judge of the age of the pathological changes and the way in which they originated." The only cases of supposed generalized pyocyaneus infections which we can accept as positive, therefore, are those in which the bacilli were found in the blood during life, or where they were found in numbers in the organs post-mortem, and seemed to stand in causative relation to the changes in those organs. Furthermore, much depends on the methods of making the blood culture. Canon, Petruschky, Stittmann, and Kühnau have shown the unreliability of cultures made from blood taken from the fingers or toes. Kühnau says the skin must be incised and the vein opened, but according to our experience it is enough to disinfect the skin thoroughly and aspirate the blood from the veins.

Few of the reported cases stand the test when judged by these criteria. Up to 1893 no case was recorded which absolutely proved the possibility of a systemic invasion by the bacillus pyocyaneus. This led Schimmelbusch to declare that although the bacillus pyocyaneus could cause local infections and resulting toxæmic conditions it could not invade the organism. Of a large number of cases reported since then only the following can be considered as at all convincing.

1. One of the two cases reported by Williams and Kenneth Cameron was in a child aged seven months. In this case no culture was made from the blood during life, but after death the capillaries of the liver, kidneys, and spleen were found blocked with minute bacilli, which cultures proved to be pyocyaneus. The organs showed parenchymatous degeneration. The autopsy was made very shortly after death.

2. Finkelstein, in a child aged three months, with a hemorrhagic diathesis, made a blood culture from a vein two days ante-mortem, using 1 c.cm. of blood. This showed bacillus pyocyaneus and the colon bacillus. The same was found in the stools and, one-half hour post-mortem, in cultures from the blood aspirated from the heart. This is the first case in which the bacilli were found in the blood by means of culture during life, and therefore really the first undoubted case of pyocyaneus baciliæmia.

3. Blum's case: Luetic child, aged two and one-half months. In this case, on the day before death, some blood was taken from the ear and examined microscopically. It was found to contain numerous bacilli resembling pyocyaneus, and the same were found microscopically and by culture in blood obtained from the heart one and one-half hours post-mortem. In the spleen and liver the bacilli were found in large numbers. In the kidneys but few were seen, although cultures showed a good growth. On the day before the infant died there developed a systolic murmur at the apex of the heart, and post-mortem there were found fine nodules at the free edges of the flaps of the mitral valve, and in these nodules and in the valve proper bacilli were found. By perforating the aortic flaps in a rabbit through the carotid artery and injecting, one hour later, a half c.cm. of a twenty-four hour bouillon culture intravenously, Blum succeeded in producing an endocarditis. Around the hole in the valve the edges were thickened and thrombi were attached. Microscopically there was found a growth of round cells, with bacilli present. Cultures of the heart-blood showed the bacillus pyocyaneus.[1]

4. The case of Czerny and Moser can probably be included in this group. In a child seven days old, by making cultures from the blood of the finger-tip, they found the bacillus coli communis on one day and the bacillus pyocyaneus the next day. A large number of control ex-

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[1] Although we are inclined to include this case among the undoubted ones, we should like to draw attention here to a fallacy in connection with staining blood specimens for bacteria. We have found, even in concentrated watery solutions of methylene-blue and gentian violet, bacilli which resemble the pyocyaneus bacilli, but are somewhat shorter and thicker. If specimens of blood are stained with such solutions the bacilli adhere to the cover-glass even after thorough washing, and the impression might be obtained that there was a marked bacteræmia. We believe, therefore, that when reports are made of the presence of bacteria in the blood by staining methods it should always be stated whether the staining fluid was first microscopically examined and found free from bacteria or not; otherwise such observations may be misleading.

periments was made which seemed to show the reliability of the result, although, as pointed out above, such cultures are not to be considered trustworthy.

5. Our case is the second in which the pyocyaneus bacillus was found in the blood during life in such a way as to exclude all doubts. This is the first case in which this finding has been made in the adult, and clearly, therefore, contradicts the view that has been held by some that systemic invasion of the bacillus pyocyaneus is limited to very early life.

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CASE OF PRIMARY HEMORRHAGIC EFFUSIONS INTO THE PLEURÆ AND PERITONEUM.

By WILLIAM S. CHEESMAN, M.D.,
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AND

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REPORT by Dr. Cheesman : In November, 1890, the patient, a woman aged forty-seven years, became aware of oppression of breathing, without pain or cough. In January, 1891, she consulted Drs. Ely and Stoddard, of Rochester, N. Y., who found the right side of the chest full of fluid. Aspiration on March 3, 1891, of fluid deeply blood-stained. On May 5, 1891, aspiration repeated, the same fluid being obtained.

She came under my care in June, 1891. She was of a remarkably vigorous stock, had one child, and always enjoyed exceptionally good health, except for menorrhagia and pain at the menses. Fibroid of the uterus had been diagnosticated some years previously, and its presence was confirmed by me. The uterus rose nearly to the umbilicus, but, barring the monthly hemorrhage, this caused no trouble.

Examination of the chest showed fluid in the right pleura. Left side normal. Heart and urine normal.

The right pleura rapidly refilled, and on July 10, 1891, I aspirated. On this as on every subsequent occasion, full precautions against infection of the pleura were taken. Their efficacy is attested by the subsequent history. Fluid was allowed to flow till the patient experienced a sense of constriction, or coughed, when the needle was withdrawn. The amount of fluid obtained was from two to three pints. It had always the same characters, was odorless, opaque, darkly blood-stained, non-coagulable, and on standing deposited a heavy precipitate, which the microscope showed to consist of blood-corpuscles. No other suspicious cells were ever discovered.

The pleura filled so fast that from July 10, 1891, to January 13, 1892, she was aspirated nineteen times. In this six months many medicines were tried, with the hope of stopping the loss of blood. She took ergot and iodine and iron and alum, and I forget what all beside. On the theory that I had to deal with a hemorrhagic pleurisy—*i. e.*, that the blood and serum were results of an inflammatory process—I tried at first, by confinement in bed, blisters, and internal absorbents, to stop the exudation, but without result. The patient did best in the open air. She never had a rise of temperature or cough, her color remained good, and she felt no discomfort except when accumulation caused dyspnœa.

But in January, 1892, it appeared that the loss of blood every ten days by the pleura and every month by the uterus was telling on her strength. Anæmia began to declare itself, though blood making went on so nearly *pari passu* with blood loss that this came slowly, and was not so pronounced as one would have expected. There had been no tendency whatever for the pleural surfaces to adhere, and when the chest was emptied one heard no friction or other sign of inflammation.

It seemed, therefore, that nothing was to be gained by further expectancy, and I decided to do what I had previously planned to do, whenever active interference seemed indicated. This was to wash the pleura free of blood, and to inject into it some substance which should excite adhesive inflammation or produce such a change in the membrane that exudation should cease. In casting about for a substance locally irritant, hæmostatic, antiseptic, and harmless if absorbed, iodine seemed most fully to meet the requirements. Accordingly, on January 15, 1892, the following operation was performed:

All utensils, tubing, needle (of large calibre), and water to be used, having been boiled several hours, and the patient's skin and operator's hands disinfected, the needle was introduced, without any form of anæsthesia, and the flow started by the aspirator. It was then continued by siphonage, the end of the tubing resting in a glass vessel on the floor. When tightness in the chest announced that the limit of safe withdrawal was reached, the lower end of the tubing was transferred (the fluid still flowing) to another glass vessel containing a quart of hot sterile water, and this being elevated above the chest of the recumbent patient, the water siphoned into the pleura. Before quite all had entered (in order to prevent admission of air), the vessel was lowered, and the water, *plus* some of the blood contents of the pleura, siphoned out again. The end of the tube was then placed in a second vessel of water and the process repeated. When, after several washings, the outflow was but slightly tinged, a quart of sterile water, containing thirty drops of tincture of iodine, which stained it a light sherry color, was siphoned into the pleura, allowed to remain some moments, and then run out again, after which a pint of Thiersch's fluid was run in and the needle withdrawn, leaving the Thiersch[1] fluid in the chest. These procedures were painless and required about two hours.

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[1] Thiersch's fluid was used as an added, but unnecessary, assurance of the asepsis of the pleural cavity In another case I would employ simply normal saline solution and iodine.

Two hours later sharp pain in the chest was felt, necessitating a hypodermic injection of morphine, and the temperature rose to 100° F., where it remained twenty-four hours. It then fell to the normal, and the reaction was over. In five days dyspnœa was felt again, and aspiration was done, the fluid coming light in color. But on March 5th (fifteen days later) aspiration was again necessary, and the fluid was found dark and bloody as of old.

The lavage had thus failed. On March 18th (about one month after the first) I repeated the washing in precisely the same manner as before, but with the important difference that after the irrigation I injected Thiersch's fluid, allowed it to escape, and then an iodine solution, containing twenty-five drops to the pint—twice as strong as at the first operation—and left half a pint of this in the chest.[1]

A reaction followed as before, with pain and a temperature of 100.5° F., and in a week fluid had returned, so that aspiration was necessary, a quart of clear, sherry-colored exudate being removed. But this terminated the trouble in the right side. No fluid ever returned there. However, a week or so after this washing dyspnœa recurred, and my surprise may be imagined when I found fluid present in the *left* pleura. Immediate aspiration removed a quart of hemorrhagic exudate precisely like that which had so long occupied the right chest. This effusion, be it observed, had occurred without chill, fever, pain, or any symptom save the mechanical one of dyspnœa.

In the succeeding three months the left pleura was aspirated seven times. It was then deemed wise to employ the lavage and iodine injection here, and on June 23, 1892, this was done just as before, except that the iodine was added to the Thiersch fluid (twelve drops to the pint), and about twelve ounces of this mixture left in. The usual reaction, with pain and rise of temperature to 100.5° F., came shortly after, and lasted three days. A slight reaccumulation of serum needed aspiration five days later, but only a pint of pale fluid was obtained.

This ended the trouble on the left side. From that time to this there has been no chest difficulty of any sort. It seems fair, therefore, to claim that the lavage and iodine injections exercised a controlling influence upon the pleural manifestations of the disease.[2]

The patient now returned to Rochester, and Dr. Ely resumed the care of the case.

Report by Dr. Ely: A period of four months ensued, in which the patient enjoyed undisturbed health. But in October, 1892, she noticed for the first time some abdominal enlargement, which steadily increased till fluctuation was apparent, with moderate dyspnœa and œdema of the legs. The urine was normal. On November 9, 1892, I tapped the abdomen and withdrew seventeen pints of bloody serum, which was examined and found to be similar to that withdrawn from the chest in 1891.[1] Complete relief followed the operation. But the abdominal effusion recurred, and on December 19, 1892, I drew off thirteen pints of bloody serum. From this time, for the next five years, the operation was repeated forty-one times at varying intervals. A small trochar was used, with strict antiseptic precautions, and no local or general disturbance followed. The patient remained quiet for three hours after each operation; she would then go about as usual, never being confined to the house by the effusion or its withdrawal.

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[1] During this operation the needle plugged once, and while I was cleaning it by the stylet, the patient took a deep breath, and air whistled loudly into the thorax. Amphoric breathing and voice evidenced this accidental pneumothorax, but it was absorbed in a few days; a further instance of the surgical innocuousness of air merely.

[2] Of course, iodine has been frequently used as an injection in empyema, but its employment in hemorrhagic effusions I had not heard of at the time I used it. It was not until a research was made that its similar use by Dr. J. G. Hyndman, Cincinnati Clinic, 1877, vol xii. p. 15, was discovered. His case was one of active pleuritic inflammation, two aspirations giving exit to six and four pints of clear, coagulable fluid. A third aspiration obtained twenty-four ounces of bloody exudate. Dr. Hyndman then injected one ounce comp. solution of iodine, diluted with twelve ounces of water, and allowed it to remain five minutes. Fever persisted for a week, but recovery followed. Dr. Hyndman regarded the hemorrhage as proceeding from the tender vessels of a newly organized membrane on the pleura. Had the iodine injections failed it was my intention to use a solution of sulphate of zinc, 1 to 100, which Dieulafoy employed once with success in a case of hemorrhagic pleurisy.

When the fluid was first removed from the abdomen, multiple fibroids were found springing from the *fundus uteri*. As they caused no inconvenience they received no treatment. Various remedies were employed to arrest the effusion, but their effect was not marked. In November, 1894, the fluid extract of *aralia hispida* (dwarf elder) was prescribed. This was taken for over two years, as the patient thought it helped her. It has been employed for chronic peritoneal dropsies.

In its later stages the disease corresponded to the climacteric period, and it is noteworthy that the arrest of the effusion nearly coincided with the cessation of menstruation. The last tapping was on September 11, 1897, and the final menstrual period was on March 10, 1898. Since the last tapping the patient has remained perfectly well, and as twenty months have elapsed with no recurrence of the abdominal effusion, I think that complete recovery has occurred.

The following summary of the tappings may be of interest:

Year.	No. of tappings.	No. of pints removed	Largest No. at one tapping.	Smallest No. at one tapping.	Longest interval.	Shortest interval.
1892	2	30	17	13	39 days	39 days
1893	10	83½	11	3½	49 "	24 "
1894	11	62½	8	4	41 "	21 "
1895	10	44	7	3	43 "	27 "
1896	6	31½	9	3½	59 "	36 "
1897	4	27½	12	3	121 "	28 "

Summary by Dr. Cheesman: Here, then, was a woman enjoying good health, except for hemorrhagic effusions, which, driven successively from the right and left pleural cavities, recur in the peritoneum, finally, after six and a half years, to disappear at the menopause. How shall this clinical picture be accounted for?

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[1] This fluid, of which Dr. Ely sent me a specimen, exactly resembled that drawn from the chest. I sent it to Dr. Wm. H. Welch, of Johns Hopkins University, who kindly examined it microscopically and bacteriologically, and made inoculation tests. But no light was thrown thereby on the causation —W. S. C.

Zahn[1] has suggested thrombosis of the vena azygos as a possible cause of double pleural effusions, passive hyperæmia and blood leakage ensuing from the obstruction. It is not clear, however, from the report of his case that damming of the azygos was the cause of the effusion, and in his experiments on rabbits stoppage of the azygos failed to be followed by bloody effusion of the pleura. At any rate, this could not produce a peritoneal effusion also.

Manifestly, also, no simple inflammatory process covers all the facts. Hemorrhagic effusion accompanies simple pleuritis in one of two ways: either the intensity of the process leads to local stasis, with rupture of arterioles, or diapedesis of red corpuscles without rupture; or else the exudation membrane becomes organized, and its young vessels give way, as in *pachymeningitis hemorrhagica.* These cases might be appropriately termed *pachypleuritis hemorrhagica.* In them one or two aspirations often suffice to cure. The acutely inflamed and exuding membranes are thereby brought in contact, adhere, and obliterate the pleural cavity. Many such experiences are reported. In our case, however, there was no rise of temperature, pain, or cough, and when the effusion had been removed by aspiration, no friction sound indicated the presence of neomembrane or rough surface; while the unannounced transference to the peritoneum remains unexplained on this theory.

One of the commoner causes of hemorrhagic effusion into the serous sacs is tuberculosis. Indeed, some hold that every hemorrhagic pleural effusion is an expression of local tuberculosis. Dieulafoy tells us this may occur in three ways: either as part of an acute general tuberculosis, or as a complication of chronic tuberculosis, or as the result of a local tuberculosis limited to the pleura. In our case the first two possibilities were never entertained. In the early months of the patient's illness, however, grave anxiety was felt lest the third condition might exist. But time has negatived that.

Cancer of the serous membranes was likewise a possibility that gave concern, and the existence of a uterine tumor seemed to bring the case into line with Lawson Tait's observations ‘‘ On the Occurrence of Hemorrhagic Pleuritic Effusion in Association with Disease of the Abdomen.[2] He relates two cases.[3]

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[1] Archiv f. Patholog. Anat., c. xl. pp. 345–360.

[2] Medico-Chirurgical Transactions, 1891–2, vol. lxxv.

[3] The first was a woman, aged 26 years, who had symptoms of peritonitis after confinement, the abdomen swelling enormously. Five quarts of nearly pure blood were removed by tapping, and four weeks later nearly the same quantity, one-half blood and one-half water. Both pleuræ became the seat of bloody effusion, three and a half pints being taken from one, and two and a half from the other side; then abdominal section, with discovery of ovarian cancer, and death on the third day. Autopsy showed fungating masses on the pleural surface of the diaphragm secondary to cancer in the abdomen. The second case was a single woman, aged 36 years. Abdomen greatly swollen, and a tumor felt floating in effusion and moored to the pelvis. Left pleura full; aspiration obtained six pints of blood-stained fluid. Right pleura

One exemplifies the familiar fact that malignant disease of the peritoneum and pleura may cause hemorrhagic effusions; the other, that similar bloody serosities may occur with non-malignant abdominal disease. In both cases the abdomen was the first seat of trouble, which Tait explains by the presence of ovarian disease, malignant in one case, benign in the other. Our patient had fibroid of the uterus. We cannot, however, find in this an explanation, for the pleuræ were attacked before the peritoneum. At any rate, malignant disease, like tuberculosis, is ruled out by the patient's recovery.

We have come, by a process of exclusion, to view our case as an example of what the French term primary hemorrhagic effusions, the effusion constituting the sole morbid entity. This amounts in the last analysis to a confession of ignorance, yet Dieulafoy, Chouppe, Vulpian, Rosenback, Osler, accept this pathological view, and cite rare illustrations coming under their observation. We have found no case, however, which parallels ours in its metastases, duration, and eventual recovery.

GASTRIC ULCER AT THE MASSACHUSETTS GENERAL HOSPITAL, 1888–1898.[1]

By Robert B. Greenough, M.D.,

and

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In connection with an article by Dr. J. Collins Warren on "The Surgery of Gastric Ulcer, with the Report of a Case of Gastrolysis,"[2] the writers undertook a study of the cases of this disease which were operated upon at the Massachusetts General Hospital for the ten years 1888–1898. To supplement this investigation Dr. Warren obtained permission to make use of the medical records. It was hoped by this means to bring out the possibility and often the advisability of an operation in a much larger number of cases of ulcer. This proved to be the case, and the subject was discussed by Dr. Warren in his paper. The records, however, afforded so good an opportunity for a collection of statistics that it was suggested that a report be made on the whole

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next affected and bloody fluid found. Malignant abdominal disease, with secondary pleural infection, diagnosticated, Tait refusing to operate. Effusion removed thirty times in the next year, eight to fourteen quarts being obtained each time. Tait now did abdominal section, removed a solid fibrous tumor of the right ovary, and patient recovered.

[1] Read in part before the Boston Society for Medical Improvement, April 10, 1899.

[2] Read before the Boston Society for Medical Improvement, May 16, 1898. Boston Med. and Surg. Journ., vol. cxxxix. p. 308.

subject of gastric ulcer for this period. This we have attempted to do with the help and under the direction of Dr. Warren and your President, Dr. Fitz.

The great mass of statistics on the subject of gastric ulcer is based on the results of post-mortem examinations, and is chiefly of a pathological nature. Little can be added to what Dr. Welch[1] wrote on this subject in 1885 for Pepper's *System of Medicine;* but, as only a small portion of those afflicted with this disease die during its course, it is obvious that statistics bearing on the clinical course of gastric ulcer are especially to be desired. Recently Leube[2] reported 556 cases which came under his own observation, but no such exhaustive collection has been attempted as that by Welch on the pathological side. The subsequent condition of such patients has been still less studied, and along this line there is little positive knowledge. It is with this subject—the after-history of these cases—that the present paper is chiefly concerned, since knowledge as to the results of treatment have been obtained in 114 of the 187 cases which occurred during the decade.

In the ten years 1888–1898 there entered the hospital 187 cases of gastric ulcer. These patients were about equally divided between the two hospital medical services, and this fact affords an opportunity for studying the disease under somewhat different conditions. The total number of medical patients who entered the hospital during this time was 13,097, which gives us the percentage of gastric ulcer to the total number of patients as 1.4 per cent. This result is in striking harmony with the conclusion Welch[3] draws for Europe—namely, that there are open ulcers present in 1 to 2 per cent. of persons dying from all causes. In his 32,052 autopsies, however, about 5 per cent. showed cicatrized or open ulcers, the scars being about two and one-quarter times as frequent as the open ulcer. In Lebert's[4] clinical material of 41,688 cases seen in Zurich and Breslau there were 252 cases, or only 0.64 per cent., of ulcers of the stomach.

Geographical Distribution. It is a well-known fact that the disease is more frequent in some localities than in others. Thus Berthold[5] (his and the following statistics being based on autopsies) gives 2.7 per cent. for Berlin; Nolte,[6] 1.23 per cent. for Munich; Gneiss,[7] 8.3 per cent. for Kiel and 10 per cent. for Jena, and Starck,[8] 13 per cent. for Copenhagen. We have been able to determine the comparative frequency of gastric ulcer in Baltimore, Chicago, Denver, and Boston through the kindness of Dr. Capps, of Chicago University; Drs. McCrea and Cushing, of the Johns Hopkins Hospital, and Dr. Hobart E. Warren, of Denver University. These facts are shown in the following table:

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[1] Welch. Pepper's System of Medicine, 1885, vol. ii. p. 480.

[2] Leube. Beitrage Centralbl. für Chir., 1897, No. 28, p. 66.

[3] Welch. Loc. cit.

[4] Lebert. Quoted by Welch, loc. cit.

[5] Berthold. Loc. cit. Ewald, Krank. des Magens., p 382.

[6] Nolte. Loc. cit. Ewald, Krank. des Magens., p. 382.

[7] Gneiss. Loc. cit. Ewald, Krank. des Magens., p. 382.

[8] Starck. Loc. cit. Ewald, Krank. des Magens., p. 382.

Medical admissions.		*Diagnosis of gastric ulcer.*
Massachusetts General Hospital, Boston	13,097	187, or 1.43 per cent..
Johns Hopkins Hospital, Baltimore	9.517	30, or 0.32 "
Cook County Hospital, Chicago	3,930	6, or 0.15 "
Arapahoe County Hospital, Denver	5,040	6, or 0.12 "

Welch claims that in general the disease is more common in northern than in southern countries, and this statement is partially confirmed by the preceding data.

v. Sohlern[1] found that ulcer was comparatively rare in a part of Russia, in the Roen Mountains, and the Bavarian Alps of Germany. He attributes this immunity to the greater amount of potassium salts in the water of those localities. A similar investigation would be of interest in this country, but it is beyond the scope of this paper.

Sex. Sex has played a prominent rôle in the minds of all in the etiology of gastric ulcer. Thus Welch found in 1699 cases that 40 per cent. were male and 60 per cent. females. Brinton[2] puts the average higher—*i. e.*, two to one—and Willigh[3] goes further yet and makes the proportion three to one. Fiedler[4] examined 2200 bodies with reference to ulcer or ulcer scars, and found 20 per cent. women to 1.5 per cent. men, which gives the proportion as fourteen to one, the highest we have found stated. With this exception the susceptibility of females to gastric ulcer compared with that of males appears far higher in Boston than elsewhere. One hundred and fifty-seven of the cases at the hospital were females and only thirty males, thus making the proportion five to one. No such disproportion exists in the total number of males and females admitted to the hospital. Indeed, the number of male admissions usually exceeds that of the female. The explanation of this great preponderance of ulcer cases in females in Boston we must leave unanswered. In the hospital, at any rate, gastric ulcer among men is a rare disease, there being but one case to 436 admitted, this being about the number of patients occurring in a single six months' service.

The importance of sex in etiology has been recognized from the earliest days, and Schröder[5] and Kuttner[6] in the last decade have called attention to gastric hemorrhage occurring at the time of the menstrual flow, especially in ulcer patients, where the mucous membrane is obviously more sensitive. Bearing this in mind, we searched the records for cases which should show some connection between the vomiting of blood and the menstruation. In two cases the first vomiting of blood took place at the catamenia, and in two others amenorrhœa was coincident with the beginning of symptoms. There was nothing else recorded of sufficient definiteness or note to warrant mention.

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[1] v. Sohlern. Der Einfluss der Ernährung auf die Entstehung des Magengeschwürs. Berl. klin. Wochen., 1889, No. 13.

[2] Brinton. Fleiner, Krankheiten der Verdaunngsorgane, p. 266.

[3] Willigh. Fleiner, p. 266.

[4] Fiedler. Sitzungsber. des Dresdener Vereins f. Natur u. Heilkunde, 1883, cited by Ewald, Krank. des Magens., p. 383.

[5] Schröder. Die Chirurgie des Magens, Schröder, Lindner, Kuttner. Loc. cit., p. 131.

[6] Kuttner. Loc. cit.

Age. The age of the patients closely corresponds to what has already been written on the subject. There was no case exceptionally young or old, the two extremes being eight and sixty-seven years respectively. The ages of patients at autopsy give an incorrect idea in this regard, and, therefore, we quote Lebert's[1] statistics instead of those of Welch for comparison:

Years	5–10	10–20	20–30	30–40	40–50	50–60	60–70
Lebert	1	24	87	84	34	17	5
	9.92 per ct.		67.86 per ct.		20.24 per ct.		1.99 per ct.
Massachusetts Gen. Hosp.	1	22	109	33	13	8	1
	12.29 per ct.		75.95 per ct.		11.23 per ct.		0.53 per ct.

The average age of the male patients was 36.75 years and that of the female 27.1 years. Eleven of the male patients were under the age of thirty, and 113 of the female. This corresponds with the statistics given by Welch. Gastric ulcer thus is most common in women between the ages of twenty and thirty, and in men a decade later.

Trauma. Trauma was ascribed as the cause of the ulcer in some of our cases, but not with sufficient clearness to merit discussion.

Occupation. So much has been written of the prevalence of gastric ulcer among servant girls and cooks that we examined the records with especial reference to this point. Realizing that these classes of society are in predominance among the hospital patients, we have also calculated out the relative per cent. in which they stand to some two hundred consecutive female admissions. This is shown in the following table:

Occupation.	157 *female ulcer patients.*	216 *consecutive female admissions.*
Housework	66 per cent.	71 per cent.
Cooks	7 "	4 "
Dressmakers	11 "	8 "
Nurses and nursery maids	5 "	6 "

Though the cooks figure rather more prominently in the ulcer column than in that of the general admissions, they in reality play a very subordinate rôle in the total number of patients. Of the male patients there was but one tailor and three shoemakers, and only two of the remaining number worked in an especially warm environment. Occupation, then, so far as our statistics go, plays a very insignificant part in the causation of ulcer.

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[1] Lebert. Welch, in Pepper's System of Medicine.

Symptoms. There has been a growing tendency in the last few years to put the symptomatology of gastric ulcer on a firmer basis. Fitz and especially Fleiner have brought this out in their books. Disturbances of secretion and motility are facts, whereas pain and vomiting are but symptoms. Following out this idea, Fleiner has the following arrangement in his symptomatology of ulcer:

In the first place is the disturbance of secretion of the stomach, which writers now pretty generally recognize as the true basis of the other symptoms. Then comes pain, and then the disturbed motor function, including "peristaltic unrest," antiperistalsis, and vomiting under this head. The fourth symptom is hæmatemesis. In our opinion he is right in thus throwing emphasis on the disturbance of gastric secretion in ulcer. Though a stomach tube can be seldom passed, a few properly directed questions can throw much light on the activity of the stomach's secreting cells and its muscular fibres. It is in this way that we may hope to make progress in diagnosis. The order of frequency of the chief symptoms occurring in the hospital patients was as follows:

Frequency of symptoms.	*Total number of patients*, 187.			
Vomiting	179	cases, or	95.7	per cent.
Pain	173	"	92.5	"
Vomiting of blood	147	"	78.6	"
Pallor	131	"	70.1	"
Tenderness	130	"	69.5	"
Constipation	123	"	65.8	"

Vomiting was the symptom most uniformly present, being absent in but four patients, and with the matter left doubtful in four others. The time of vomiting was so variable in the different patients, and in fact in the same individual, that little of value could be gleaned from the records in this regard. This is unfortunate, because the statements of authors diverge so widely on this point. Ewald[1] and Leube[2] say the vomiting occurs soon after eating. Boas[3] puts it at the height of the paroxysm of pain, and Osler[4] "not for two or more hours after eating." Hemmeter does not commit himself. Thus these conflicting statements show that the time of vomiting is not a factor in diagnosis. The quantity of the vomitus is also indefinite, for one must take statements of the amount of vomitus with caution. This symptom will be further discussed under hemorrhage.

Pain. The pain was definitely located in practically all the cases, though not always confined to one special area. Thus pain was felt in the epigastrium in 144 of the 173 cases in which pain occurred as a symptom, but in only ninety-one of this number was it wholly confined to this locality. How varied was its distribution can be seen from the following table:

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[1] Ewald. Loc. cit., p. 398.

[2] Leube. Specielle Diagnose, I., p. 260.

[3] Boas. Spec. Diag. und Therap. der Magenkrank., II., 36.

[4] Osler. Loc. cit., p. 481.

Situation of pain.

Epigastrium	91
" and back	23
" back and chest	2
" " right costal border	1
" " left hypochondrium	5
" " right hypochondrium	2
" and left hypochondrium	8
" and chest	4
" and between shoulders	2
" and left shoulder blade	3
" and umbilicus	1—51
Total epigastrium and elsewhere	142

Various writers have called attention to the situation of the pain in regions not adjacent to the stomach, and the significance of this fact has not been by any means over-estimated, as our table shows. In differential diagnoses between gastric ulcer and gallstones too much dependence must not be put on the symptoms of pain in the right shoulder, for, as Brinton[1] has pointed out, pain may be situated there in ulcer. In a case of perforation of an ulcer into the lesser peritoneal cavity, recently seen by one of the writers of this article, the pain was felt at the top of both shoulders.

Attention has been called to pain in the back in gastric ulcer, and the importance of the pain elicited on pressure in this region has been insisted upon by Boas[2] as a valuable diagnostic sign. He goes so far as to say that dorsal pain on pressure is, in his experience, present in one-third of all ulcer cases. Though we are dealing with pain as described by the patient, and not with tenderness, the following table may be inserted as to a certain extent carrying out his view. Dorsal "druckschmerz" was not sought for with sufficient uniformity to be recorded, but this table would lead us to suppose that it often existed, on account of the many cases with pain in the back:

Situation of pain.

Back	1
" and epigastrium	23
" epigastrium and chest	2
" and chest	1
" epigastrium and right costal border	1
Between shoulders and epigastrium	2
Back, epigastrium, and left hypochondrium	5
" " and right hypochondrium	2
" right hypochondrium and right shoulder	1
Left shoulder blade and epigastrium	3—40
Total back and elsewhere	41

In one case the pain was felt only in the back, but otherwise the symptoms presented nothing peculiar. This patient vomited blood, and blood was present in the stools, though there was no severe hemorrhage. She was fed by the rectum exclusively for six days following her admission, and we learn that since leaving the institution she has had a recurrence of the disease.

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[1] Brinton. Quoted by Fleiner, p. 272.

[2] Boas. Spec. Diag. und Therap. der Magenkrankheiten, p. 38

It is reassuring to note how few times pain occurred to the right of the median line. Six instances only of this sort came to our attention.

It is worthy of note that only three patients spoke of their pain as occurring before meals, and that only about the same number were relieved by food. As ulcer patients have a hypersecretion of the gastric juice, as a rule, we should expect this symptom to be more frequent. It may be accounted for, perhaps, in this way, that in comparison with the severity of the pain after meals that present before dropped out of mind. The pain followed the ingestion of food in 102 individuals. It was unrelated to meals in nineteen cases. In eighteen persons the pain was continuous. Usually the pain was relieved by vomiting, and several times it was lessened by pressure. Here, again, opinions differ. Osler[1] writes: "Pressure is, as a rule, grateful." Leube:[2] "By external pressure it (pain) is generally increased, very seldom relieved," while Dr. Fitz[3] agrees with both by saying: "Pressure sometimes aggravates, at other times lessens, the pain."

Pain was not felt at all in fourteen of the 187 patients, and the character of the disease in these cases is instructive. In 50 per cent. of this number the onset of the ulcer was with hemorrhage of a severe type, and three of these seven cases died, thereby, as will be seen later, constituting nearly one-half of all the fatal cases of hemorrhage. Five others also had marked hemorrhages, while the diagnosis of the disease was somewhat doubtful in the two remaining patients. Thus it appears that those cases of ulcer of the stomach in which there is no pain represent, as a rule, a grave type of the disease.

Hemorrhage. Hemorrhage is considered by Osler,[4] Hemmeter,[5] and others as present in about 50 per cent. of all cases of gastric ulcer. Leube[6] met with this symptom in 46 per cent. of 556 cases. The term hemorrhage is so broad that we have divided our cases into two groups. In the first are classed all cases which vomited blood, no matter what the amount. This is the hemorrhage class of the books. In our second group we put those cases in which the loss of blood was so appreciable as to cause symptoms directly attributable to this loss. In many cases the blood-count helped in the classification.

One hundred and forty-seven of the 182 patients in which the records are available vomited blood either during their stay in the hospital or immediately preceding entrance. This gives the hospital percentage for hemorrhage as 81 per cent. This is certainly a striking difference from the usually accepted data. Possibly in the statistics of others cases from the polyclinic were made to figure, and, if so, that would account for the unusual severity of the disease at the hospital.

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[1] Osler. Practice of Medicine, 1898, p. 482.

[2] Leube. Loc. cit., p. 260.

[3] Fitz. Wood and Fitz, loc. cit., p. 838.

[4] Osler. Practice of Medicine, 1898, p. 481.

[5] Hemmeter. Diseases of the Stomach, 1897, p. 476.

[6] Leube. Loc. cit.

Eighty-six cases form our second group, and constitute the number in which the loss of blood was productive of constitutional symptoms. Thus 45 per cent. of the cases had one or more severe hemorrhages.

Hemorrhage ushered in the symptoms of ulcer nineteen times—in fifteen instances in females and in four in males. This bore no relation to the age of the individual, for the youngest of these patients was a woman, aged twenty years, and the oldest a man, aged fifty-three years, while the average age of these nineteen male and female patients, 38.2 and 28.9 years, respectively, closely corresponds to that which obtains for the whole number of patients. Fleiner discusses this question of hemorrhage as the first symptom of ulcer of the stomach, and it is to be conceded, as he says, that usually the ulcer is present long before the hemorrhage. It is possible, however, for a sudden occlusion of an artery to take place, a necrosis and autodigestion to follow, and the vessel or a neighboring one to be thus opened up, as Schell[1] recently reported.

The hemorrhage was fatal in seven cases, or 3.7 per cent., and in three of this number it was the first symptom. The fatality as regards sex is striking, as five of the thirty male patients, or 17 per cent., died from hemorrhage alone, while only two of the 157 females, or 1.27 per cent., died from this cause. (Note.—It is but fair to say that in two of the fatal cases of hemorrhage in males there was no autopsy.) It would thus seem that women can lose blood with greater impunity than men, and this is easy of belief.

The ages of the five male patients who died of hemorrhage were twenty-five, forty-seven, fifty-two, fifty-seven, and sixty, giving an average of forty-eight years to contrast with 36.75 years, the average of all male patients. The ages of the two female patients so dying were thirty-six and forty-nine, giving an average of 42.5 years to contrast with 27.1, the average age of the whole number of females.

These facts indicate in no uncertain way that the younger the individual the less probability of death from hemorrhage in gastric ulcer. Whether this is wholly due to the better recuperative power of youth or to changes in the arteries or blood remains to be seen.

Hood,[2] some years ago, called attention to the rarity of fatal cases of hemorrhage in gastric ulcer in females under thirty. In the years 1870–1890 at Guy's Hospital, London, there were sixty-six cases of hemorrhage due to gastric ulcer; and though there were twenty-nine of this number (twenty-seven females, two males) under thirty, but one case proved fatal, and that a male. Referring to these statistics, he writes: "They . . . bring out the striking fact that during a period of twenty years at one of our largest London hospitals there has been no recorded case of fatal hemorrhage occurring in the person of a young female the subject of gastric ulcer." The same statement can be made of the Massachusetts General Hospital for the ten years 1888–1898. Perforation, on the other hand, is not limited to age or sex. Hood, therefore, suggests that hemorrhages from the stomach in anæmic young women are often not due to ulcer, and that in general the symptom receives too much attention in the diagnosis of this disease. At any rate, the above statistics allow us to agree with Hood, "That hemorrhage from the stomach in early adult female life is usually not a symptom of great gravity."

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[1] Schell. Review in Arch. f. Verdauungskrank, 1898, p. 390.

[2] Hood. The Medical Society's Transactions, London, vol. xv. p. 283.

It had been our opinion, as gathered from the books, that it was not the violent hemorrhage which killed but rather the sum of repeated hemorrhages or a constant oozing from the bloodvessels. This opinion was evidently well founded, for in five of the seven fatal cases the hemorrhages were recurrent and extended over a considerable period of time, while in two only did the patients die soon after the hemorrhage, and then only in three and nine days, respectively. It is of interest to add that in these two cases hemorrhage was the first symptom, and one patient had no pain at all except for a few hours, and no especial tenderness. Gastric hemorrhage, therefore, kills by the subsequent exhaustion it entails rather than by the immediate loss of blood.

Operation was performed twice for hemorrhage, but hardly other than an untoward result could have been expected, because it is recorded of one patient before the operation, "pulse at times cannot be felt," and in the other case the surgical procedure was considered only a forlorn hope. No one hesitates at the present time to call the surgeon early for consultation in appendicitis. In typhoid fever, where perforation threatens, this is also common; in severe cases of gastric ulcer a consultation should be the rule.

The presence or absence of blood in the stools is too difficult a problem to be left to the patient to decide. Hosslin[1] says that a hemorrhage arising in the stomach only gives the stools the characteristic tea color when it amounts to 500 c.c. As probably but few of our gastric hemorrhages reach this amount, it is obvious how many times blood must be lost unnoticed. A microscopical examination, on the other hand, unless in the hands of experts, may only serve to give a wrong idea in the matter, since crystals of sulphide of bismuth to closely resemble hæmin crystals as to be easily mistaken for them. With these considerations in mind it is rather surprising that blood is recorded present in the stools fifty-five times. But that such data are unreliable is evident when we consider that probably most of the patients were taking bismuth and many iron at the time of the observation.

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[1] Hosslin. Münch. med. Wochensch., 1890, No. 14.

Pallor. Pallor was observed in 131 of the 164 patients in which a record of this condition was made, and was thus absent in only 20 per cent. of these cases. It is only within the latter half of the present decade that routine examinations of the blood have been made in all cases at the Massachusetts General Hospital, and our data upon this point represent only a limited number of cases. The hæmoglobin was estimated in seventy-three cases, of which thirty-four were below 50 per cent. and sixty-four below 80 per cent. This is about the proportion of cases in which pallor was noted to be present, and would establish the fact that about 80 to 85 per cent. of ulcer cases show a diminution of hæmoglobin, which accords with the view of other observers—Cabot,[1] v. Limbeck.[2] The red corpuscles were counted in forty-three cases, and in only twenty-four, or about one-half, were below four millions. This suggests a greater diminution of hæmoglobin than of corpuscles in the majority of cases, and this ratio is expressed by the "color index" of writers on the blood. The color index is the per cent. of hæmoglobin divided by the per cent. of corpuscles, and is calculated on the basis of 5,000,000 red corpuscles and 100 per cent. hæmoglobin to the normal blood. The color index in forty-three cases gave an average of 0.67, the highest being 1.41 and the lowest 0.35. In other words, as Silbermann,[3] Cabot,[4] Leube,[5] and others have pointed out, an anæmia of the chlorotic type is the rule.

The interest in this fact lies in the etiological significance of a reduced alkalinity of the blood, such as occurs in chlorotic anæmia (Silbermann, Pavy,[6] Leube), and our statistics may be considered at least suggestive in this connection four cases of the series showed indices above one. These were all young females with severe, sudden, but not fatal hemorrhages, and we are at a loss to explain the phenomenon. Cabot[7] states that "A color index above one is not met with except in pernicious anæmia." Osterspey[8] reports two cases with index above one (3,296,000 reds and 70 per cent. hæmoglobin = 1.06, and 4,048,000 reds with hæmoglobin 84 = 1.05). One of these cases was a young girl, aged eighteen years, with hemorrhage; the other a man, aged forty-eight. Cabot himself mentions one similar case, but attributes it to a mistake.

The average color index in six males was 0.64, and in thirty-seven females 0.68; no marked difference can be noted with regard to sex.

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[1] Cabot. Clin. Exam. of Blood. Wm. Wood & Co., 1897.

[2] v. Limbeck. Grundriss einer klinischen Pathologie des Blutes, June, 1896.

[3] Silbermann. Zur Lehre von Ulcus Ventriculi rotundum. Deut. med. Woch., No. 29, 1886.

[4] Cabot. Loc. cit.

[5] Leube. Specielle Diagnose.

[6] Pavy. Pepper's System of Medicine.

[7] Loc. cit.

[8] Osterspey. Die Blutuntersuchungen und deren Bedeutung bei Magenkrank., Berlin, 1892.

Five of our cases showed one peculiar feature in that the hæmoglobin appeared to diminish during the first few days in the hospital without corresponding loss of corpuscles or recognized hemorrhage. This diminution of from 5 to 15 per cent. continued for from seven to ten days, and was then followed by slow recovery. The explanation may perhaps be that the dilution of the blood and formation of new corpuscles proceed more rapidly than the manufacture of new hæmoglobin.

The subjoined table will indicate the general character of the blood examinations:

Hæmoglobin, 73 cases.

20 to 30 per cent.	7	70 to 80 per cent.	8
30 " 40 "	10	80 " 90 "	5
40 " 50 "	17	90 " 100 "	3
50 " 60 "	15	100+ "	1
60 " 70 "	7		73

Red Corpuscles, 43 cases.

1 to 2 millions	6	5 to 6 millions	10
2 " 3 "	7	6 " 7 "	0
3 " 4 "	11	7 " 8 "	2
4 " 5 "	7		43

Tenderness. Tenderness has perhaps led to as many wrong diagnoses of ulcer as any one symptom. This sign has been too often elicited by leading questions on the physician's part. The Boas æsthesiometer contributed to the undue emphasis put upon it. This may partly account for the reaction which has already set in, and it is with great satisfaction to us that in the last edition of Osler that writer gives still less prominence to the subject than in his earlier edition. The symptom is most indefinite, in our opinion, and should have a small share in diagnosis. Of the 187 patients, 130 showed more or less tenderness, but the records made evident that fifty-one patients were distinctly not tender, and the matter was left in doubt six times. That tenderness was absent fifty-one times is especially suggestive, because the patients were cases in which the course of the ulcer was a severe one and the period of observation long. Hysterical symptoms are so common in chlorotic girls that the wonder is that more of them did not agree to a sensitiveness on pressure in the abdomen.

Constipation. It is not surprising that constipation occurred in 123 of the 152 cases in which notes on this matter were made, because for the most part the patients were women, and of a class of society apt to pay little attention to the rules of health.

Perforation. Perforation occurred in six, or 3.2 per cent., of the total number of cases. Four of the cases were in females, or 3.2 per cent., of the whole number of female patients. One was a male, giving 3.3 per cent. as the frequency of perforation among men. Thus no such difference exists in the sexes in perforation as does liability to a fatal hemorrhage. Age appears to have little to do with the matter, as the females were eighteen, twenty-two, thirty, forty-one, and fifty-seven, and the one male patient was twenty-six. No perforation occurred without previous symptoms of ulcer, though in the case of a cook, aged forty-one years, there had been only very slight dyspeptic trouble for one month. In the other patients symptoms of ulcer had been present for periods varying from a few months to two and one-half years, and the complication plainly took place in an old ulcer. As a rule, when the perforation occurred it came on suddenly and left little doubt as to what had happened. All of the patients with perforation died, but one of these, a woman, aged thirty years, lived seventy days, and the autopsy revealed a parenchymatous nephritis as the direct cause of death and as coexistent a fibrinous perigastritis. This patient, in the two and one-half years preceding her entrance to the hospital, had had three attacks of hemorrhage, and whether this, as has recently been suggested, was contributory to her nephritis is a question. Certain it is, however, that on June 9, 1889, the date of the perforation, her urine was normal, but on August 18th of the same year it contained casts. On this day she had convulsions and died. For this reason in our mortality table her death is entered as perforation and parenchymatous nephritis.

The study of the perforation cases is chiefly of interest from a surgical point of view, and it has seemed worth while to tabulate these six cases for convenience:

Case.	Days between perforation and death.	Diet at time of perforation.	Operation.	Situation of perforating ulcer.	Autopsy and result.	Remarks.
E. 3	3	House diet at Convalescent Home.	Not advised by surgeon, patient moribund.	Lesser curve and posterior wall.	General peritonitis.	Convalescing at Waverly. Tonsillitis; perforation.
E. 28	15	Home. ?	Refused 24 hours after perforation.	Anterior wall.	Local abscess.	
E. 18	70	Starvation for 14 days before in M. G. H.	Not advised by surgeon.	Lesser curve.	Adhesions; no pus.	Died of nephritis.
E. 40	3	Milk in M. G. H.	0	?	No autopsy.	
W. 72	7	Liquids in M. G. H.	Six hours after perforation.	Lesser curve, anterior.	General peritonitis; no autopsy.	
W. 77	? No diag. in life.	Never starved.	0	Lesser curve, anterior.	Local abscess.	Not recognized in life as ulcer.

The situation of the ulcer is found to have been upon the lesser curvature in four cases, of which two perforated anteriorly and one posteriorly. In one case the ulcer was on the anterior wall, and in one the situation was not known. The statistics of Welch[1] are of interest in this connection, and would seem to justify the frequency of the lesser curvature as the seat of the ulcer in our cases:

Welch. 788 cases.

Lesser curvature	283	36 per cent.
Posterior wall	235	29 "
Pylorus	95	12 "
Anterior wall	69	8 "
Cardia	50	6 "
Fundus	29	3.7 "
Greater curvature	27	3.4 "
	788	

The situation of the ulcer is of especial interest to the surgeon, on account of the varying results of perforation. In our six cases general peritonitis resulted twice, and in both instances the ulcer was situated on the lesser curvature, one anteriorly and one posteriorly. In two cases local abscess resulted, one where the ulcer was on the anterior wall and one where it was on the lesser curvature and perforated anteriorly. Perigastritis prevented any untoward results in one case, and in the last patient no autopsy was obtained. These facts are suggestive in that they show that the perforation into the general abdominal cavity is not the most likely result, but that adhesions may bar the spread of infection even in cases of ulcer of the anterior wall; and that in all probability the mobility of the stomach and its freedom from adhesions are the factors most important in determining the immediate results of perforation.

Another fact to be noted in our cases is that only one of them suffered perforation of the ulcer when on starvation diet, and that this one alone survived the perforation and died later of nephritis, with only a fibrinous perigastritis to mark the site of the ulcer. An operation was performed upon one case six hours after the perforation, but as the patient had been taking large quantities of liquids (℥viij. ev. 2°), a fatal result was not unexpected. In the other five cases an operation was once refused by the patient and twice by the surgeon. In one case the record is deficient, and in the last the disease was not recognized during life.

RESULTS. Welch,[2] in his oft-quoted article, gives 85 as the percentage of cures in gastric ulcer. Leube,[3] in 1897, recorded 74 per cent. cured of 556 patients treated by himself. Ewald[4] gives 75 per cent. in an analysis of 123 hospital patients, but Debove and Remond,[5] from a study of one hundred patients, show only 50 per cent. complete cures.

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[1] Welch. Pepper's System of Medicine.

[2] Welch. Loc. cit.

[3] Leube. Loc. cit.

[4] Ewald. See Lindner-Kuttner, p. 113.

[5] Debove and Remond. Cit nach Mikulicz die chirurgische Behandlung des chron. Magenschwurs. Mitteilungen aus de Grenzgeb. des Med. u. Chirurgie, 1897, Bd. ii. p. 188.

As to mortality, the figures vary between 50 per cent. (Debove and Remond) and 2 per cent. (Leube).

With these data in mind we have worked up the hospital statistics in two ways: In the first place, classifying the condition of the patients as stated in the records at the time of their discharge, and in the second place according to their state of health at the present time. We have interviewed personally or by letter the patients, their friends or employers, doctors, postmasters, city and town officials.[1] To all of these we would express our gratitude and appreciation that through them we have been able to report on 114 cases. For the sake of comparison we insert the report of the condition at discharge of 187 cases of gastric ulcer—the total number—treated at the Massachusetts General Hospital between 1888–1898:

Cured	121	64 per cent.
Relieved	34	18 "
Deaths	15	8 "
Otherwise	17	9 "

Report of the condition at discharge of 114 cases of gastric ulcer in which the subsequent condition could be determined:

At discharge		*At an average of five years later.*			
		Recurrence.	*Dead.*	*Cured.*	*Total.*
63 Cured	55 per cent.	28	8	27	63
29 Relieved	25 "	10	4	15	29
15 Deaths	13 "	...	...	...	...
7 Otherwise	6 "	3	3	1	7
114		41	15	43	99

Of the fifteen patients who died after leaving the hospital the cause was known to be gastric in eight, non-gastric in three, and doubtful in four. Revising the latter half of the last table with these facts in mind we have:

Table showing mortality and condition of 114 patients of gastric ulcer at an average period of five years after entrance to the hospital:

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[1] The following letter was sent out:

BOSTON, MASS., May 6, 1898.

Dear ....

Wishing to obtain some statistics regarding the disease from which you suffered, with a view to furthering our knowledge of this affection, I take the liberty of asking you to favor me with answers to the following questions:

1. Has your health been good since leaving the hospital? Answer.
2. Have you had any pain in the region of the stomach? Answer.
3. Have you vomited? Answer.
    - *a.* If so, how many pints at one time? Answer.
    - *b.* Was there any blood in the material vomited? Answer.
4. Have you been constipated? Answer.
5. Have you gained or lost weight, and how many pounds? Answer.
6. Have you had eructations of gas or any other marked symptoms of dyspepsia? Answer.

A return of this paper with the desired answers in the inclosed envelope before May 12th, will greatly oblige,

Yours respectfully,

MASSACHUSETTS GENERAL HOSPITAL.

J. COLLINS WARREN, M.D.

Cured 43 + 3	46	40 per cent.
Not cured—recurrence	41	36 "
deaths 15 + 8	23	20 "
deaths, cause unknown	4	4 "
	114	

The cause of death in the twenty-three instances in which it was related to the ulcer can be summarized as follows:

	Males.	*Females.*	*Total.*	*Per cent.*
Deaths in the hospital—				
Hemorrhage	5	2	7	3.7
Perforation	1	4	5	2.7
Perforation and parenchymatous nephritis	0	1	1	0.5
Exploratory laparotomy	1	0	1	0.5
Cancer[1]	1	0	1	0.5
Deaths outside the hospital—				
Gastric	1	7	8	
	9	14	23	

The mortality was therefore relatively much higher among the males than the females, being 30 per cent. in the former instance and only 9 per cent. in the latter. When one consults the literature on this point but little satisfaction is obtained. The difference is so striking, however, as to suggest a distinct variety of the disease in the two sexes. This view is enhanced by the fact that the age incidence in males is about ten years later than in females, and that hemorrhage is fourteen times as fatal in the men as in the women.

When we compare our mortality of 8 per cent. with that of Leube's of 2 per cent. it leads to deep reflections. There is no question but that the hospital dealt with a severer type of the disease, as its percentage of hemorrhage cases was 81 to his 46; yet even with this allowance, and leaving out the death by exploratory laparotomy, that by nephritis, and that by cancer, the mortality remains nearly twice as great. The more closely to bring out these differences we put the main features side by side:

	Leube.	*Mass. Gen. Hospital.*
Mortality	2.0 per cent.	8.0 per cent.
Hemorrhage	0.8 "	3.7 "
Perforation	1.2 "	2.7 "

Eighty per cent. of the patients were considered cured or relieved at the time of their discharge, but our later information shows that relief continued in but forty-six instances, or 40 per cent. Of ninety-nine patients who left the hospital we know that eight subsequently died[2] of gastric trouble, and that forty-one had a recurrence of ulcer symptoms. A recurrence, then, took place in one-half of the cases. Twelve of this number, however, reported themselves well at the time of writing. Statistics on this point are not easily obtainable, and hence their significance. They point to the seriousness of an ulcer of the stomach, and if this paper does no more than to impress this fact more strongly on the profession we shall feel rewarded for our labor. It certainly is startling to realize that every other patient with gastric ulcer that one sees in the hospital is either to have a recurrence of symptoms or is never to be well again.

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[1] This was a case of ulcus carcinomatosus. The patient's first hemorrhage occurred in June, 1893, and he entered the hospital for the first time on March 27, 1894. He returned August 23, 1894, and again later on, August 6th and October 25, 1895, when he finally died, and the autopsy showed that a cancer had developed about an old ulcer.

[2] Seven other patients died after leaving the hospital; in three of these the cause of death was known to be other than gastric; in four it was in doubt.

We had hoped to be able to estimate the number of cases which resulted in cancer and in dilatation, but the reports received are not specific enough to warrant us in drawing deductions of this nature. Ewald[1] is certainly right when he says: "Ich habe mit den Jahren diese Narbenbildungen fast noch mehr wie das primäre Ulcus fürchten gelernt."

TREATMENT. The results of treatment show that the percentage of recovery in both medical services of the hospital was the same. In one service it was the general rule to stop all food by the mouth for the first few days after entrance. On the other, this treatment was resorted to only in the severer cases, the diet being more often restricted to a small quantity of milk and lime-water for a corresponding number of days, and later on increased. The figures regarding the treatment are here given:

	Service A.	*Service B.*	*Total.*
Number of cases with no food by mouth .	71	31	102
Number of cases with food by mouth . .	23	60	83
Doubtful	2	0	2

The average duration of the period in which the patients received food by nutrient enemata was 8.39 days, the longest period being thirty-six days and the shortest one day. We then studied these two classes of cases with reference to their condition since leaving the hospital, and thereby found the following result:

	No food by the mouth.		*With food by the mouth.*	
Cured	20	32 per cent	23	44 per cent.
Not cured	42	68 "	29	56 "
	62		52	

From these tables it would appear that only 32 per cent. of those receiving food by the mouth were cured, in contrast to 44 per cent. of cures in those patients who were given small quantities of milk and lime-water from the outset; but one must bear in mind that it was chiefly the severe cases which were put on nutrient enemata alone, and that this fact directly tended to make a less favorable showing for the starvation method. Another fact is, furthermore, of interest—namely, that the patients who were starved remained a longer time in the hospital on the average than those who were fed small amounts of milk and lime-water. Evidently it took longer for the former class of patients to get built up, and this was natural, for their condition was worse at entrance.

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[1] Ewald. Loc. cit., p. 407.

Conclusions based on the study of 187 cases of gastric ulcer occurring at the Massachusetts General Hospital, 1888–1898:

1. Gastric ulcer is more frequent in Boston than in Chicago, Baltimore, Denver, or San Francisco.
2. It is five times as common in women as in men.
3. The average age in men is thirty-seven years; in women twenty-seven.
4. Hemorrhage was present in 81 per cent. of the cases. It caused the death of 17 per cent. of the male patients, but only 1.27 per cent. of the females. No woman under thirty died of hemorrhage from gastric ulcer during this period.
5. The blood was that of a chlorotic type of anæmia.
6. Perforation occurred in 3.2 per cent. of the cases, and none of these patients left the hospital alive.
7. Of 114 patients 80 per cent. were discharged cured or relieved, but at the end of an average period of five years only 40 per cent. remained well. The mortality at the same time (due to gastric disease) was 20 per cent. Among the males it was 30 per cent., with the females 9 per cent.
8. The excessive mortality of ulcer among men, its occurrence in life a decade later than in women, and the absence of fatal cases of hemorrhage in females, point to a difference of the ulcer in the two sexes.
9. The mortality of 8 per cent., and the failure of medical treatment to effect a lasting cure in 60 per cent., of the patients indicates the need of surgical intervention in other than emergency cases of this disease.

A CASE OF TWO DISTINCT FRACTURES OCCURRING IN THE SAME PATELLA AT AN INTERVAL OF EIGHT MONTHS.

By John Norman Henry, M.D.,

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Recently the writer was asked by a lawyer representing the plaintiff in a suit for damages against a large foundry in Philadelphia to examine the said plaintiff and appear in court as a witness in the suit then pending.

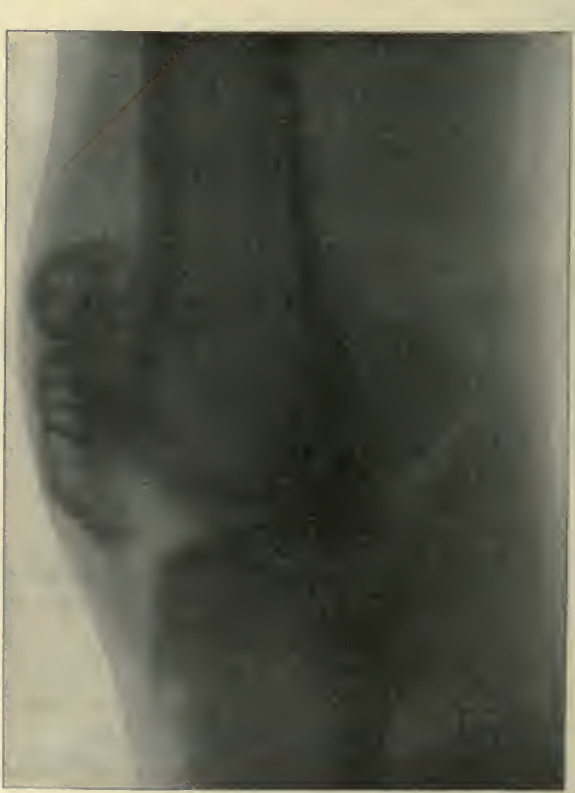
The case briefly was as follows:

The plaintiff, while walking past the foundry on the evening of January 31, 1898, slipped on some loose fragment of bricks and fell, sustaining a fracture of the left patella. These fragments of brick, he claimed, were left on the sidewalk by agents of the foundry, and on this ground he brought suit for heavy damages.

In looking up the record of his case at the Pennsylvania Hospital, in which institution he had been treated, it was found that on June 8th of the year preceding—that is, a little less than eight months before the date of his last fracture—he had sustained a previous fracture of the same patella.

As the lawyers for the defense had also engaged medical counsel, this fact could not but be known to them.

On February 7, 1899, examination of the injured knee and patella showed a truly remarkable result, when the fact of there having been two fractures in the same patella is taken into consideration ; but one fracture could be made out, and in that the union was so close and firm that in the centre no separation whatever could be felt, while at the edges the separation did not exceed one quarter of an inch.



There was in addition some slight fibrous anchylosis of the knee-joint, and also some limitation of motion due to adhesions which had formed between the upper fragment of the patella and the femur.

The patella itself was much hypertrophied, measuring three and one-quarter inches in length.

At the time of the examination the patient expressed himself as confident that the two fractures had not been in the same place, and that the first one had been nearly an inch below the second. As the physical examination, however, could not discover any evidence of the existence of two fractures, this statement was ascribed to the natural anxiety of the man to make his case as strong as possible.

However, in view of the statement of Hamilton[1] in regard to the strength of ligamentous union—*i. e.*, that after five months have elapsed since the sustaining of a fracture of the patella, refracture is no more likely to take place than if the primary accident had never occurred—in view also of the reiterated statement of the patient himself, it was thought advisable to consider the probability of there being two different fractures and have an X-ray picture of the injured bone taken.

The result was surprising as well as satisfactory from the plaintiff's stand-point, as the picture unquestionably declared two separate fractures, as is shown in the accompanying figure.

The case went to trial, the X-ray was admitted and recognized as evidence, and after all the evidence on the plaintiff's side was in, a settlement was effected and damages awarded the plaintiff.

The X-ray picture certainly proved of value in this case, as it nullified what seemed to be a very strong point in favor of the defendant—namely, the contention that the plaintiff had a patella already weakened by the first accident, and as a result received an injury which in a normal individual might not have happened.

In looking up the literature of the subject but one similar case was found recorded.

It does not seem unlikely, however, that the condition may have been frequently overlooked in cases of apparent refracture, as most certainly would have been the case in this instance without the aid of the X-ray.

BRONCHIAL OBSTRUCTION BY SUPPURATING BRONCHIAL GLANDS.

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The bronchial glands and their diseases are passed over with slight mention in most of our text-books, if we except the usual statement that they become enlarged in tuberculosis and other diseases. It is certainly not common to find bronchial obstruction which may be attributed to pressure from them; yet many cases have been reported in which autopsy has shown compression of the trachea or bronchi by enlarged glands, and in several cases they have softened and broken into the air-passages. The older authors—Gerhardt, Rilliet and Barthez, and Weigert—all quote instances found on the auptosy table of such perforation. Eichhorst[1] saw three cases in whch bronchostenosis followed such rupture of suppurative bronchial glands into the bronchi, presumably by cicatricial contraction. Loeb[2] reports a case in which a boy, aged four years, recently recovered from whooping-cough, died in one hour from suffocation from the presence in the trachea of a slough from a bronchial gland. By a valvular action it interfered much more with expiration than with inspiration. He tabulates fifteen other cases, dating back to 1843, in which obstruction occurred in the air-passages from a sloughing bronchial gland too large to be expectorated, as proven by autopsy in fourteen instances. In the remaining case some partially disintegrated fragments of the gland were removed by means of a catheter through the tracheotomy wound, when it was found that the operation had afforded no relief, and a still larger piece was ejected afterward. The child recovered (Petersen's case).

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[1] See Hamilton: Fractures and Dislocations.

Poland[3] mentions a case in whch a suppurating caseous bronchial gland opened into the œsophagus and the left bronchus.

Parker[4] reports a case of sudden and fatal dyspnœa due to a bronchial gland which had ulcerated into the trachea of a child of twelve months. Nachod[5] saw a case of bronchial stenosis following the rupture of a peribronchial lymph-gland into the bronchus. Bayeux and Audion[6] have recently reported a case of perforation of the right bronchus by a caseous bronchial gland. Poupon[7] mentions a case in which a softening tuberculous gland ruptured into the trachea and right bronchus. Several other less definite references to the condition we are studying may be found, practically all in foreign journals.

We have, then, abundant pathological grounds upon which to base a diagnosis of suppurating bronchial gland, causing at first pressure upon a bronchus, and, later, upon rupture—a severe bronchitis limited to the area supplied by that bronchus, with eventual expectoration of the disintegrated gland and possibly recovery. I saw, with Dr. H. B. Whitney,[8] a case of suppuration of bronchial glands opening into the œsophagus, with complete recovery. Reports of similar cases have several times been made, chiefly by German writers. Recovery seems to be much more common in these cases, doubtless owing to the non-implication of the air-passages.

I find no record, however, excepting in Petersen's case, already quoted, of the diagnosis in a patient that recovered from the condition supposedly present in my case. In that case portions of the offending gland were recovered at the time of the tracheotomy. It is peculiarly annoying that the fleshy mass expectorated in my case could not have been preserved for histological examination. Nevertheless, I believe the case to be of sufficient interest to merit publication. It is as follows:

X., a prominent physician of this State, aged forty-seven years, has lived in Colorado for seventeen years, and been engaged in professional work about equally distributed between in-doors and out-of-doors. There is no family history of any lung trouble. He has not had syphilis. The patient has had a winter cough for five years, and on this account went South last winter for two months, obtaining much relief. Aside from this cough he has been fairly well, and has for some years gradually increased in weight.

On October 29, 1898, he consulted me for a return of his cough, which had then lasted about six weeks. He was anxious particularly, because one examination of the sputum three years before had shown a few tubercle bacilli, although it has been repeatedly examined, with negative result, since that time. The patient appeared in excellent health, and was well developed. The chest was fuller than normal. There was some bulging above the clavicles, and the lungs reached a trifle lower than normal in the back. I have noted, however, for many years that this condition is extremely common in those who have lived long at an altitude such as that of this patient's home, about 7600 feet. The lungs were slightly hyperresonant everywhere. Over the left lung, loudest in its upper half, were many wheezing, sonorous, and sibilant râles, but no moist ones. The patient stated that he could distinctly feel that the obstruction which he noticed in breathing was entirely upon the left side and at the upper and central portion, where the râles seemed to originate. There was marked diminution in the vesicular murmur over the affected area, and diminution in voice transmission and in fremitus. The left side expanded less freely than the right upon inspiration. There was no spinal tenderness.

The signs, so suggestive of the presence of a foreign body in the left primary bronchus, led to careful inquiry as to such a possibility, but with entirely negative result. Examination of the throat by Dr. Robert Levy was practically negative. The pupils were normal, there was no tracheal tugging, the heart was negative, and in the absence of any signs except obstruction of the bronchus, aneurism of the aorta was excluded. The expectoration was scanty, and consisted of mucus. Owing to difficulty in expectoration I prescribed a cough mixture containing ammonium chloride, and directed the patient to avoid exposure to cold.

On December 3d, five weeks later, the patient returned and gave a history of gradually increasing expectoration, until, for two weeks past, it has amounted to between one and two pints daily, consisting of pure pus. His dyspnœa had been severe, and he had lost sixteen pounds in weight. The wheezing had gradually disappeared. He stated that on the preceding day, with a particularly severe cough, he expectorated a larger amount of much thicker sputum than usual, containing a comparatively firm, fleshy mass, which, unfortunately, he did not preserve for examination, since it was ejected into the flowing stream of the closet. It seemed to him that this spasm of coughing cleared up, to a great extent, the long-felt obstruction.

Since then he has breathed more easily, and the amount of the expectoration has decreased at least three-fourths, but is still abundant.

Since the last examination there has been a daily rise of temperature to about 101° F., but he has at no time been confined to bed.

Physical examination showed an entire absence of wheezing râles, while at the base of the left lung, front and back, affecting the lower two to three inches, were moderate dulness and abundant fine, moist râles, the latter being noticed especially at the end of inspiration; voice and fremitus were about normal. Right lung negative. The sputum, examined by Dr. G. H. Stover, was made up almost entirely of pus-cells, with an enormous number of staphylococci. No tubercle bacilli were found.

On December 10th the temperature was slightly subnormal at 3 P.M., pulse 59. Expectoration had practically ceased. He had coughed up two or three very small clots of blood during the past week. Absolutely no abnormal signs were to be found in the chest aside from the slight emphysema mentioned. He had resumed his work, and was in his usual health for this season of the year.

The cough becoming more troublesome in February, the patient went to Texas, as he did last year at this season. Here his cough practically ceased, and he regained one-half of the sixteen pounds which he had lost. On April 4th he had again taken up his work, coughing slightly, but was in no way worse than for five years past. His sputum at this time, examined by Dr. Stover (April 11, 1899), contains a few epithelial and pus-cells, a few staphylococci, and, less frequently, the micrococcus tetragenus. No tubercle bacilli were found.

I realize that the diagnosis in this case can be at best only a probable one, but it is of great interest to carry the differentiation as far as is possible under the circumstances. The history and the complete recovery lead us to throw out of consideration at once several conditions which may cause obstruction of a bronchus, notably aneurism of the aorta, malignant tumor affecting the bronchus, the œsophagus, the lung or neighboring parts, or the bronchial glands, as in the case reported by Landouzy and Dejèrine,[9] of melanotic disease rupturing into the left bronchus and causing death; leukæmic glandular enlargement, tumor of the thymus, Gerhardt's bronchostenosis ecchondrotica, pericardial effusion, as mentioned by Eichhorst,[10] greatly dilated left auricle (King [11]), syphilitic stenosis, stenosis from other ulcerative processes—in fact, everything excepting foreign body in the bronchus and obstruction from some cause eventually giving rise to suppuration.

Spasmodic narrowing of the trachea may occur in hysterical subjects, if we are to credit the reports of Landgraf and Gerhardt, Lublinsky, Heymann, and Chaput,[12] while M. J. Simon[13] attributes it to malarial poisoning. I am not aware of any claim that this condition may affect the bronchi, and in any event it needs only to be mentioned in this connection to be excluded.

The utter absence of history of the introduction of a foreign body from without, given as it is by a physician especially qualified to testify upon such a subject, and the recovery without expectoration of such a body, lead me to exclude it. We have, further, the minor point that such obstruction is usually, for anatomical reasons, upon the right side. The non-expectoration of a cyst, calcareous nodule, bronchial cartilage, gallstone, renal stone, or other foreign body of internal origin, with the lack of any history pointing in this general direction, suffices for excluding this possible source of the trouble.

Of causes giving rise to suppuration, with possible emptying of pus into the bronchus, we may consider suppurating lymphatic glands, softening tuberculous glands, mediastinal abscess, and vertebral abscess.

In the absence of all signs of bone disease we exclude the latter condition. The symptoms have not been of such a degree of severity as to warrant the diagnosis of mediastinal abscess in its larger sense, and there has been no dulness or displacement of the heart such as we should expect under such conditions. It is difficult at this time to distinguish between a tuberculous softening of a bronchial gland and suppuration from the ordinary pus-producing organisms. From the known presence of a few tubercle bacilli three years ago, the frequency of tuberculosis of the bronchial glands, and the well-known tendency of such glands to soften in certain cases, we might reasonably expect to find that this case was to be explained by such a process. In connection with the winter cough of the past five winters, however, there has been abundant opportunity for infection by other germs, and a mixed infection is more probable. The absence of tubercle bacilli and the presence of abundant pus-cells and pus-producing cocci certainly suggest a pyogenic infection or a mixed one rather than a purely tuberculous process.

I believe we have by exclusion arrived at a probable diagnosis already mentioned, since no other that I can conceive of suffices to explain all of the conditions. Let us trace out the course of the case, step by step, to see how it agrees with the circumstantial evidence presented. A man who, for five winters, has had attacks of bronchitis of several months' duration, and in whose sputum tubercle bacilli were found sparingly three years ago, would probably have enlarged bronchial glands, which, from the presence of tubercle bacilli or pus-producing organisms, might well suppurate. Such glands might well account for the bronchial obstruction of October 29th. The gradually decreasing obstruction, as shown by the decrease of the wheezing from this time until December 2d (the day before the second examination), and the gradually increasing expectoration, until it amounted to more than a pint daily, we should expect, with the coincident fever, severe dyspnœa, and loss of weight, in the event of the occurrence of a slowly-oozing rupture of the suppurating focus, with gradual discharge of its contents into the bronchus and production of a local broncho-pneumonia. If a gland finally sloughed out—a process which we know is possible from the many cases quoted—

it might pass the glottis if not too large to be expectorated. Immediate relief of the remaining obstruction would be anticipated, and from this removal of the obstruction there would follow prompt improvement as regards the bronchitis, and consequent lessening of the expectoration.

Recovery would be possible if the infection had not been sufficiently severe to cause death by either of the conditions mentioned by Marfan[14] as usually fatal in such cases—namely, gangrene or abscess of lung, pneumonia, broncho-pneumonia, or pulmonary œdema. Finally, if this diagnosis be not the correct one, to what pathological conditions may we look for an explanation of the course of the disease in this case?

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A CRITICAL SUMMARY OF RECENT LITERATURE

ON

CONCUSSION OF THE SPINAL CORD, WITH SOME ORIGINAL OBSERVATIONS.[1]

(From the William Pepper Laboratory of Clinical Medicine. The Phœbe A. Hearst Foundation.)

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MUCH has been written on the subject of spinal concussion, and almost every physician has seen these cases of paraplegia in the lower limbs developing gradually after trauma. We are by no means certain that all these cases are either functional or the result of injury to the parts external to the spinal cord. I fully believe that most of them are functional, but I also believe that the proof has yet to be offered that spinal concussion does not occur in man, as it certainly seems to occur in animals.

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[1] Read before the Section in General Medicine of the College of Physicians of Philadelphia, April, 1899.

Schmaus[1] has recently reviewed this entire subject, and he acknowledges that no perfectly satisfactory case of spinal concussion in man is on record. We must remember that acute fatal cases of spinal concussion in man are very rare. When death occurs early the spinal column is usually fractured or extensive intravertebral hemorrhage has formed. The changes we should expect to find in spinal concussion would be minute intramedullary hemorrhages and degeneration of nerve-fibres and nerve-cells.

As an illustration of the class of cases I have in mind I give the brief clinical history of one of my patients seen in the clinic for nervous diseases at the Polyclinic Hospital.

P. B., male, aged twenty-nine years, fell and struck the chest heavily upon the handle of a truck, and soon after this accident had difficulty in passing urine, and has since been more or less constipated. Three days after the fall, which he regarded as of little importance, he began to have dull pain in the lumbar region. He now has incomplete paraplegia of the lower limbs; the gait is slightly spastic; both knee-jerks are greatly exaggerated; ankle clonus is marked on the right side, abortive on the left; no disturbance of sensation exists in the lower limbs, and no atrophy is noticed. All venereal disease is denied.

This is a case in which spastic paraplegia, with exaggeration of the knee-jerks and ankle clonus, developed gradually after a fall which does not appear to have been very severe. It seems to me impossible to make a positive diagnosis, although I believe the case is probably one of a purely functional nature, notwithstanding the existence of ankle clonus. The subject of the post-traumatic neuroses has been recently so thoroughly discussed by Putnam[2] and others that I have nothing new to add to it.

Sometimes we find a case in which the spinal cord can with more certainty be said to be intact, notwithstanding the presence of severe symptoms. As an example, the condition of the following patient, sent to me by Dr. M. J. Stern, may be mentioned.

H. C., male, aged twenty-eight years, was struck in the left lumbar region by a mass of ice weighing two hundred and fifty pounds or more, and was knocked about twenty feet. He was not rendered unconscious by the blow, and could move the arms after the accident; he could talk and could move the right lower limb, but the left lower limb was entirely powerless, according to the patient's statement, and felt numb. He had also some difficulty in urination, but no disturbance of defecation. When I saw him he had extensive areas of ecchymosis over the sacrum, tenderness on slight pressure to the left of the coccyx and over this bone, and this region was considerably swollen and was evidently the seat of a hæmatoma. The only area of anæsthesia was one about three inches in length and two in width, to the left of the sacrum. No anæsthesia was found in the perineum, over the external genitalia, or in the lower limbs. The knee-jerk was exaggerated on the right side but normal on the left. The man could stand, but could not walk.

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[1] Schmaus. Münchener med. Wochenschrift, January 17, 1899, No. 3. The more extensive paper by Schmaus (Ergebnisse der Allgemeinen Pathologie, etc., Lubarsch and Ostertag. Vierter Jahrgang, Wiesbaden, 1899) was received after my paper was in print. Schmaus's conclusions are the same as those published by him in January, 1899.

[2] Putnam. Journal of Nervous and Mental Disease, 1898, p. 769.

The diagnosis was not as difficult as might be thought. After carefully studying the case I decided that disease of the spinal cord could probably be excluded. The man had received a very severe blow in the lumbar region, and while he was somewhat weak in his right lower limb he had much less power in his left lower extremity. If the spinal cord were involved the left half must have been much more affected than the right; and while this condition from trauma might have existed, it seemed hardly probable. The blow was received in the lumbar region, and if the cord were involved it would probably have been involved in the portion nearest the seat of injury. In the lower lumbar vertebræ only the cauda equina is present, and a unilateral lesion of the cauda would be more improbable than one of the cord, as in the latter we might have a hemorrhage limited to one side of the gray matter. Furthermore, sensation was disturbed only over the seat of the hæmatoma; the sensation of the perineum, external genitalia, and lower limbs was normal, which we should hardly expect if the cauda equina had been injured. The left knee-jerk was normal. This indicated that the left half of the lumbar region was not affected, and it was believed that a lesion above the lumbar region would probably have caused exaggeration of the knee-jerk on the left side. These were the chief considerations which led me to conclude that no organic change had occurred within the spinal cord, notwithstanding the severe injury. The hæmatoma was opened, and I am informed by Dr. Stern that the patient was dismissed improved. His later history is unknown to me.

Nonne[1] has reported a case of traumatic paraplegia which might well have been regarded as one of organic nature. Prominence of the lumbar vertebræ, pain on pressure over the vertebræ, weakness of the lower limbs, with pain and paræsthesia in these parts, exaggerated tendon reflexes, with other symptoms following a severe blow in the lumbar region, were sufficient to make a diagnosis of fracture of the vertebræ or spinal caries, developing as a result of trauma, worthy of careful consideration. The prominence disappeared under extension. As the disappearance of a gibbosity by such treatment has not been observed in traumatic spondylitis, and as spontaneous pain and pain on pressure would probably also vanish with the disappearance of the gibbosity if the latter were due to caries, Nonne concluded, after a careful consideration of the case, that a functional disturbance would best explain the symptoms. The prominence was thought to be largely due to muscular contraction. A necropsy was obtained about two years after the accident. The spinal vertebræ and cord were found to be normal, although Nissl's method was not employed. The examination showed, according to Nonne, that the diagnosis of functional disturbance was correct.

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[1] Nonne. Archiv für Psychiatrie, vol. xxxi. No. 3, p. 519.

We can expect to obtain a necropsy in a case of traumatic paraplegia without vertebral fracture or extensive hemorrhage only by the fatal termination of some intercurrent disease, and, so far as I know, no case of concussion is yet on record in which a satisfactory microscopical examination of the spinal cord of man was made a few weeks or months after the injury. Until such an examination has been accomplished the question as to the existence of spinal concussion in man cannot be regarded as settled. Nonne's case is exceedingly important, and it will doubtless be quoted as proof that spinal concussion does not occur in man; but it is possible that degeneration of nerve-fibres within the white columns of the cord occurred, even in this case, in the early days of the paraplegia, and that this degeneration was sufficient to cause impairment of function without the formation of sclerotic tissue.

The case I have to report of traumatic paralysis of the hind limbs in a cat is in evidence of the existence of spinal concussion in animals. The cells of the anterior horns of the spinal cord have been examined by the method of Nissl, or a modification of this method, in a very few cases of so-called spinal concussion. They have been studied recently by Kirchgaesser[1] and by Scagliosi.[2]

A number of writers have believed that the motor cells of the cord are diseased in certain of these cases of concussion. Kirchgaesser's investigations and my own do not support this view, although Scagliosi's are in favor of it. It must be confessed that Kirchgaesser studied the nerve-cells in only two cases and I in only one.

A kitten was caught and squeezed by a heavy swinging door on the morning of Wednesday, June 1, 1898, and died on Monday, June 6, 1898, about two o'clock in the afternoon. The spinal cord was removed about half an hour later. The box in which the animal was kept was wet during the time the kitten was in it, but no feces were seen. The functions of the bladder and rectum were probably disturbed, but of this I cannot be certain. The animal was completely unable to move the hind legs or tail, and had no sensation in these parts. I could pinch either the hind leg or the tail without causing any manifestation of discomfort or any attempt on the part of the cat to drag itself away.

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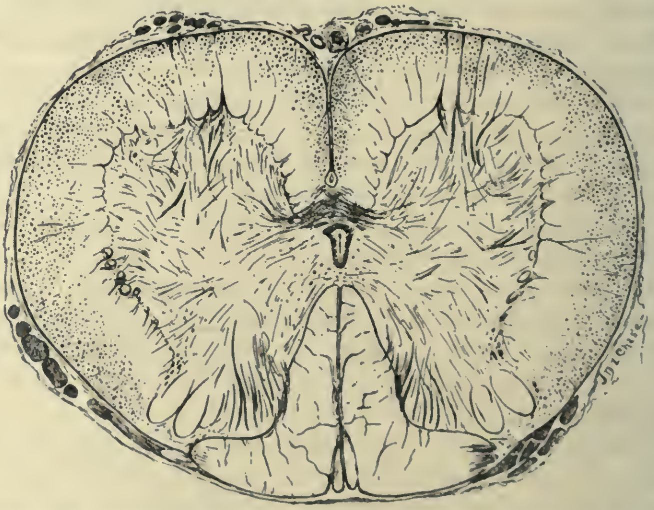
[1] Kirchgaesser. Deutsche Zeitschrift für Nervenheilkunde, vol. xiii. p 422.

[2] Scagliosi. Virchow's Archiv, 1898, No. 152, p. 487.

The animal did not suffer spontaneous pain, for it played with an object held before its front paws shortly after the injury. In walking it dragged its hind limbs and tail as lifeless masses, and no voluntary motion could be observed in any of these parts.

A portion of one sciatic nerve was "teased" and placed in a 1 per cent. solution of osmic acid, but distinct degeneration could not be found. The spinal cord was hardened in formalin and later in Müller's fluid, and sections from the lumbar region were stained with acid fuschin, Delafield's and Weigert's hæmatoxylin, by the thionin method of v. Lenhossék and the Marchi method. The nerve-cells stained by thionin were almost normal. The nuclei of the cells in the lumbar region stained very intensely, and possibly the chromophilic elements were not quite so distinct as in the cervical portion of the same cord or in another spinal cord from a normal cat. Some nerve-cells in the lumbar region were distinctly altered, but these altered cells were not at all numerous. The cellular changes appeared to be unimportant. A few capillary hemorrhages were found in the pia and gray matter of the lumbar region.



The black dots in the anterior and lateral columns represent nerve fibres in an early stage of degeneration.

What was the cause of this complete paralysis of the posterior limbs after severe trauma? The vertebral column was not fractured; it contained no hemorrhages, and the macroscopic appearance of the spinal cord was normal. The sciatic nerve was intact. I had expected to find chromatolysis of the nerve-cells, but was disappointed. My results, so far as the nerve-cells were concerned, were similar to those of Kirchgaesser. The five days during which my cat lived seemed almost too short a period for the development of degeneration detectable by the Marchi method, but in order to employ every method which might throw light on this case I stained sections from the cord by the method of Marchi.

Sections from the lumbar swelling stained by this method showed distinct degeneration in the antero-lateral columns of each side, especially marked along the periphery of the cord, in the lateral pyramidal tracts, and along the anterior fissure. (See figure.)

I have employed the method of Marchi very frequently during a number of years, and I am well aware of the errors into which one may be led if he is not on his guard. I believe, however, that these numerous black dots in this cat's cord are indicative of pathological change, because the posterior columns, the gray matter, and the lateral limiting zones of Flechsig are free from evidences of degeneration, and in the uppermost part of the lumbar region the black dots in the antero-lateral column are much less numerous than in the mid-lumbar segments.

Careful examination of these black dots shows that they are transverse sections of medullary sheaths, and a small space between them and the surrounding neuroglia may not infrequently be seen. I believe this is the earliest stage of degeneration detectable by Marchi's method, except in the manner employed by Schaffer,[1] and I am not aware that attention has been called to it. Later the black dots are not all in connection with the nerve-fibres, and lie loosely in the tissue. v. Monakow[2] mentions in his recent work that the Marchi method does not indicate the exact course of a nerve-fibre. Schaffer has found that the Marchi method does not stain nerve-fibres in which the medullary sheaths are swollen but not otherwise altered.

My investigations only in one case confirm those of Kirchgaesser, and seem to indicate that the important changes resulting from concussion are probably not within the nerve-cells so far as the Nissl stain is capable of demonstrating them; or, at least, they are not within the nerve-cells in the early stages of concussion.

My findings are not in harmony with those of Scagliosi. His experiments were performed on rabbits, and the concussion was produced by repeated blows upon the head. He found alteration of the cells of the brain and spinal cord, consisting of chromatolysis, varicose atrophy, etc.

Wagner[3] has given most of the evidence that we have regarding the occurrence of organic changes in the spinal cord of man from concussion, and he concludes his paper with the statement that the pathological condition in concussion of the spinal cord is to be found in alteration of the nerve-cells, an alteration which our methods at present do not permit us to detect.

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[1] Schaffer. Neurologisches Centralblatt, 1898, p. 890.

[2] v. Monakow. Gehirnpathologie, p. 246.

[3] Wagner. Beiträge für klin. Chirurgie, 1896, vol. xvi. p. 493.

We must, of course, be cautious in applying the result obtained in experiments on animals directly to man; but as hæmatomyelia from trauma without vertebral fracture occurs in man, and as the manner in which this is produced is unknown, we may at least believe it to be possible that such changes in the essential tissues of the cord as have been observed in animals may develop in man after concussion.

Kirchgaesser has confirmed his former observations on concussion of the spinal cord of rabbits, in which he showed that considerable degeneration of the medullary sheaths, as indicated by the Marchi method, occurs after severe blows on the back without injury of the vertebræ and without hemorrhage into the vertebral canal or spinal cord.

He was able in two recently reported cases[1] to produce extensive degeneration of nerve-fibres at the region of the trauma and ascending and descending degeneration visible by Marchi's method. In some portions of the cords of these two rabbits spaces were found from which the nerve-fibres had disappeared. In one case it is distinctly stated that the vertebræ were not fractured, and that hemorrhage was not found within the vertebral column; and we may conclude that the conditions in the other case were similar. One of these rabbits was allowed to live seventeen days, the other fifteen. The degeneration of the white columns was general in the region of the spinal cord corresponding to the portion of the body to which the blows were applied, and involved endogenous as well as exogenous nerve-fibres, for it is stated that the pyramidal tracts and root-entrance zones were degenerated. No statements are made concerning the existence of hemorrhages within the cord, of round-celled infiltration, or of engorged vessels. Kirchgaesser found extensive degeneration of the posterior columns, which was not present in my case.

The cellular changes which Kirchgaesser found by the Nissl method in his two cases of concussion of the spinal cord were almost negative. If important changes had been found by this method we should hardly know how to interpret them. Goldscheider and Flatau[2] have taught us that cellular alteration is not always indicative of alteration of function. This view Nissl[3] accepts.

Soukhanoff[4] is among the most recent writers who have shown that alteration of the chromophilic elements does not necessarily imply alteration of function. He makes this statement after studying the nerve-cells of animals poisoned by arsenic.

Kirchgaesser was unable in his two experiments to observe any disturbance of sensation. Sensation, however, was much disturbed in my cat.

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[1] Loc. cit.

[2] Goldscheider and Flatau. Normale und Pathologische Anatomie der Nervenzeller, Berlin, 1898.

[3] Nissl. Münchener med. Wochenschrift, 1898, Nos. 31, 32, and 33.

[4] S. Soukhanoff. Journal de Neurologie, 1899, No. 3, p. 41.

In Kirchgaesser's experiments the paralysis produced by the blows upon the lumbar region disappeared after a few days, although the alteration of the cord was intense, and he believes that we cannot exclude concussion of the cord simply because paralysis does not occur at once, and that we may properly connect symptoms appearing late with a previous severe trauma.

Higier[1] has reported an interesting case of hysterical paralysis in a cat that was bitten in the back by a dog. A servant threw the cat out of a window in order to see whether it would alight on all fours. The animal, thoroughly surprised, landed on its feet and ran away, and its hysterical paralysis was cured at once. I did not attempt this heroic treatment; but hysterical paralysis in animals is probably rare, and the paralysis in my cat was doubtless organic. Death after a few days and the pathological findings support this view.

The degenerated fibres in Kirchgaesser's cases could hardly have been entirely endogenous, even though we grant the possibility of the existence of endogenous fibres within the root-entrance zones. The slight changes in the nerve-cells, as shown by Nissl's stain, indicate possibly that not all the altered fibres were endogenous. Kirchgaesser says that the cellular changes were unimportant in comparison with the alteration of the nerve-fibres. Most of the ganglion cells were normal, although some showed different degrees of chromatolysis.

It seems proper to conclude from the degeneration of fibres within the lateral columns, both in Kirchgaesser's cases and my own, that nerve-fibres may degenerate at a certain part of their course as a result of external injury, and probably may do so independently of any important alteration in the nerve-cells in which they arise. The normal condition of the cells of the spinal ganglion in tabes, as reported by Schaffer[2] after the employment of the Nissl stain, is in evidence of the same fact. Marie's[3] view that nerve-cells must be affected before nerve-fibres can become diseased, at least in systemic form, and that to accept any other theory is to show " too much honor to the nerve-fibres," is difficult to substantiate.

Alteration of nerve-cells is not always present when the axis-cylinders pertaining to these cells are diseased, and it seems to be true that to a certain extent the axis-cylinders may suffer alone. In neuritis the nerve-cells have been found normal (Soukhanoff,[4] Dejèrine[5] and

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[1] Higier. Neurologisches Centralblatt, 1898.

[2] Schaffer. Neurologisches Centralblatt, 1898.

[3] Marie. Traité de Médecine, vol. vi. p. 308.

[4] Soukhanoff. Archiv de Neurologie, 1896, vol. i. p. 177.

[5] Dejèrine and Thomas. Comptes rendus de la Société de Biologie, 1897.

Thomas), although in almost all the cases of this malady in which the cells were studied they were found in a state of chromatolysis. Nissl,[1] in speaking of the changes which occur in a motor cell after its nerve-fibre is cut, says that if this reaction were the expression of loss of function of the motor nerves we could hardly understand why the cells become normal again, although the loss of function persists.

It seems probable from these statements that cellular alteration, as seen by Nissl's method, is exceedingly common after injury of the axis-cylinder, but does not invariably occur, or if it occurs may be only temporary and not of vital importance.

We have as yet no knowledge as to the condition of the neurofibrils within the nerve-cells when the axis-cylinders are cut. The extraordinary statements made by Apáthy and Bethe lead us to believe that injury of an axis-cylinder is even more likely to effect a change in the cell of origin than we had believed. In future attention will be directed toward the pathological condition of the neurofibrils. The investigations of Becker, Apáthy, Bethe, and Held indicate that important discoveries in the normal and pathological histology of the nervous system are in store for us. The statements of Apáthy and Bethe in regard to the anatomy of the central nervous system have induced Nissl[2] to say that the neuron theory can no longer exist. v. Lenhossék,[3] however, warns us that sufficient proof has not been furnished in regard to the statement that the neurofibrils are the only conducting elements for nervous impulses, and still more recently he shows that even Bethe's[4] findings do not oblige us to deny the individuality of the neuron.

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[1] Loc. cit.

[2] Loc. cit.

[3] v. Lenhossék. Abstract of Bethe's paper in Neurologisches Centralblatt, 1898, No. 20, p. 944.

[4] v. Lenhossék's Neurologisches Centralblatt, 1899, No. 6, p. 242.

REVIEWS.

TRAITÉ DE MICROBIOLOGIE. By E. DUCLAUX, Director of the Pasteur Institute. Tome II. Diastases, Toxins, and Venins. Paris: Masson et Cie, 1899.

AFTER Cagniard-Latour and Schwann saw the budding of the yeast in beer-wort, and gradually the other fermentations, too, were found to be due to yeasts or moulds or bacteria, it was thought that the mystery of fermentation and putrefaction was solved, and that by simply designating them vital processes, or phenomena which were the result of life, everything was explained. As wonderful as the power of this life seemed to be, there was no thought that we could ever get beyond it. The prodigious activity of these minute organisms was studied, and science stood in amazement while contemplating the facts. A man consumes daily a quantity of food equal to about one-fiftieth of his weight, and for purposes of assimilation is unable to decompose more; the yeast of beer can break up daily from four to five times its weight of sugar, and is by no means the most powerful yeast.

Man was thought to be fastidious in his articles of diet on account of generations of training and refinement, but his epicurism was scarcely to be mentioned in comparison with that of these lowest plants.

Raulin composed for the aspergillus an artificial fluid, on which it was found the organism grew most luxuriantly and with least deviations in weight when full grown; he then withdrew different ones of the constituents of this perfect medium and studied the effect.

The medium was composed of water, sugar-candy, tartaric acid, nitrate and phosphate and sulphate of ammonia, carbonate of potassium and of magnesium, sulphate of zinc and of iron, and silicate of potassium. He found if he omitted the potassium entirely the growth of the plant was twenty-five times less, and if ammonia was withdrawn one hundred and fifty times less. But these constituents were present in the fluid in appreciable quantities; that which was remarkable was the discovery that if the zinc which was present in a dilution of one to fifty thousand was removed the growth was ten times less than in the original liquid—or, in other words, one milligramme of zinc was able to make a difference of seven hundred times that weight in the growth of the aspergillus.

It was these experiments that led Duclaux to observe, in 1884: "If we reflect that in a liquid containing only one fifty-thousandth part of zinc one or two generations of aspergillus might, by completely absorbing the metal, weaken or frustrate the existence of a new generation—that in such a liquid a fresh process of sowing (I was going to say inoculation) would be destined to fail—how is it possible not to reflect at the same time on the mysterious nature of virulent diseases, such as smallpox, scarlatina, typhoid fever, which never appear twice in the same person?"

When we looked around us after these discoveries, and were able to attribute so many of the essential pheuomena of nature to life, and we made this life recognizable to the eye, it was thought that the final step had been reached and that the study of chemistry had been dethroned for that of microscopy. But what the microscopist was unable to do because his field of vision was limited to morphology the chemist has succeeded in, and he has shown us by what processes the cell accomplishes these vital phenomena, or, in other words, has indicated to us its physiology.

It has been demonstrated by Croft-Hill and others that the essential physiological functions of the cell—those which characterize it as a living being—are carried out by chemical substances which scarcely belong to it, or at least can be extracted from it, and still remain capable of acting outside the cell which produced them.

The processes of nutrition comprising the decomposition of complex molecules into simpler ones, or its opposite, the synthesis of simpler substances; the coagulation and liquefaction of substances so that they can be more easily acted upon; the respiration of the cell comprising oxidation and reduction—all are the results of diastases or enzymes or ferments within and manufactured by the cell, and which produce the same effects when excreted or otherwise separated from it.

For years chemists have been studying the diastases excreted by the cells of the digestive tract which are so essential to general nutrition; rennet, with its action of coagulation on proteids; pepsin, with its action of decomposition in an acid; trypsin in an alkaline medium; the emulsifying ferments in the bile and pancreatic juice; they even comprehended that the cause of coagulation of the blood was a ferment; but that the cells themselves carried on their infinitesimally small processes of nutrition by the same or analogous diastases of coagulation and liquefaction, of decomposition, of oxidation and reduction, remained for one day to demonstrate.

It is this knowledge that draws from Duclaux the delightful simile between the cell and the court of an Indian Rajah, with its unchanging ceremonial carried on by domestics whose number equals the special work to be done, because the duties of each are determined, and encroach upon one another only in emergencies.

As yet we can only guess at the number of different diastases. It is probable that, for instance, almost every microbic species possesses one or several peculiar to it, in order to enable it to draw its nourishment from certain predilective substances or defend itself against substances injurious to it by coagulating them so that they cannot penetrate the cell, by neutralizing them or by dissolving them.

Metschnikoff's work has proven that it is the diastases produced and excreted by the phagocyte, stimulated by the diastases from the infectious microbe, that act as the means of defense to the organism, destroying by dissolution the microbes, or neutralizing their toxin, and the apparent struggle between two living beings—the cell and the microbe—is in reality a question of antagonism between chemical substances.

Like their generators—the cells—these diastases are capable of producing effects out of all proportion to their size, and though they have not the power of reproduction, they possess its equivalent immortality, inasmuch as in favorable media they continue to cause indefinitely their effect without lessening or destroying themselves.

It is to Roux and Yersin that we owe the discovery that the active principle of diphtheria antitoxin is a diastase, and following this came the knowledge that the different microbic toxins are to be classified under the same head. Being diastases they adhere to precipitates in liquids containing them; and in the organism, or when carried in the circulation, attach themselves to cells of tissues, and can even manifest preferences toward particular kinds of cells.

Wasserman and Takaki demonstrated that the brain of a guinea-pig pounded into an emulsion with sterile water and injected in a mixture with tetanus toxin had no effect on an animal, even though very susceptible to tetanus; and Metschnikoff concluded this experiment by proving that this was not due to the presence of an antitoxin, but that the toxin was only fixed and immobilized by its adherence to the cerebral cells, in the same way as in the experiments of Roux and Yersin it had adhered to the precipitate of chalk.

It is on this epoch-making work that Duclaux formulates his definition of a microbic toxin as a diastase, which, in travelling through the organism, attacks certain cells more or less necessary to it, and shows its presence and persistence by more or less profound disturbances. If this is true, and the proof is too well substantiated to doubt it, a new era in the study of toxins and antitoxins lies before us. From the fact that the destruction of a limited number of essential cells in an organism can lead to disease or death of the organism, a new disproportion between the effect and the cause (already great in the action of diastases) is added. Duclaux asks, " What is the weight of the cells of the central nervous system or of the pneumogastric that, destroyed, will lead to cessation of the movements of respiration and, consequently, death? Probably only a few milligrammes, and if these cells were killed by the action of a diastase, this need not exceed one-thousandth of a milligramme, which then would become a fatal poison for a man of sixty kilos—that is, of 60,000 million times the weight of the substance intoxicating (about one-millionth of a grain for a man of 170 pounds)."

With such wonderful facts before us the prominence of even the ultimate cell and the microbe must give way to the importance of the different diastases, and it is consequently not to be wondered at that to this study of diastases, toxins, and venins Duclaux devotes the whole of the second volume in his *Traité de Microbiologie.* The first volume of this magnificent work appeared a little over a year ago, and is principally a text-book of bacteriology, treating of bacteriological morphology, technique, and the subjects coming naturally into such a text-book.

The third volume, which is expected at the end of the year, will treat of immunity. As was to be anticipated, this treatise on diastases, their properties, description, and classification, is carried out to the limits of our present-day knowledge. It is a recapitulation of the discoveries and work done by the scientists throughout the world, arranged into a text-book by one of the best known among them.

Duclaux's style is clear, if not always concise, and, like Herbert Spencer, his apt illustrations and way of putting an uncommon thought or a new theory or an explanation that might be obscure from several aspects make him impossible to be misunderstood. If we are to judge the work from the two volumes already published, it will be an acquisition to medicine of which the whole world may be proud. J. W.

CYCLOPÆDIA OF THE DISEASES OF CHILDREN. Supplemental volume. Edited by M. A. EDWARDS, M.D. 8vo. Pp. 1332. Philadelphia: J. B. Lippincott & Co.

UP to the time of the issuing of the *Cyclopædia of the Diseases of Children* there had not appeared—nor, indeed, has there since appeared—any work devoted to pediatrics published in English so great in its conception and splendid in its execution. In fact, the publication stands alone—a memorial to the ability of the lamented Keating. It is a question whether it is not better to let such classical works be. Attempts to supplement them in any way by later writings are generally ill-advised. They mar instead of make.

There seems to have been a great lack of uniformity followed by the contributors in the construction of the articles. In some cases the effort has been made merely to supplement the original article, adding what is new and changing what is old and incorrect. This is commendable. In too many instances the authors have made their writings seemingly too complete, giving definitions and details of causes, symptoms, and pathology. This is unnecessary and a burden to the reader, since these are, for the most part, to be found in the original articles. In other instances the contributors have entirely reconstructed the original article, which is a good plan where they were the original authors. In still other cases the reader is left in some doubt whether the article is a supplement or a substitute, and he is consequently uncertain how much of the original he is still to accept as true. To some articles has been added an extensive bibliography of the past ten years, while in others only a few names are mentioned in the text, and one wonders whether or not there are others. Finally, we cannot tell whether we are to infer, because a disease is not mentioned—as, for instance, the whole class of diseases of the mouth—that there has been nothing new written on the subject in the last ten years.

Facts like these illustrate the difficulties which attend the construction of supplemental volumes, and confirm us in the feeling that the original works are seldom improved and often injured by them. Yet we fully appreciate the desire of the editor and publisher to bring the *Cyclopædia* up to date, and we admire the degree of success attained; for, after all, the volume is an exellent one—as good in most respects as can be expected with these difficulties to be met.

There are ninety-five separate sections, contributed by almost as many different writers. A number have been made by the original contributors; many have not.

We note at the outset a valuable article by Ballantyne upon Congenital Diseases and Diseases of the New-born. The paper on the Therapeutics of Children, by Hare, badly needs some detailed reference to the tolerance or intolerance of various drugs in early life. There was nothing regarding this important and practical matter in the original article by Bartholow, and a great opportunity has been missed in this supplement. The contribution on Mortality in Early Life appears to be a short sketch of the mortality in New York City—hardly sufficient for a general work of this kind.

Rotch's paper on Feeding in Infancy is an able supplement to his earlier contribution—thorough, careful, and elaborate, as his writings always are.

The section on Typhoid Fever hardly represents our present knowledge of the frequency of this disease in infancy and childhood. Experience has abundantly proven that it is not so rare in the first two years of life as the author states. A brief review of the literature of the last ten years shows this quite well.

J. Lewis Smith's paper on Diphtheria was one of the best in the *Cyclopædia*, and Lennox Browne's supplement is satisfactory in every respect save one—viz., the writer's attack upon the serum treatment. Argument of any sort is out of place in a cyclopædia of this nature, in which the writer is expected to give less of his own opinion and more of the accepted views of leading authorities in general, with a careful weighing and balancing of these. But in this contribution many pages are wasted in argument, often somewhat sophistical and never convincing, against the widely accepted opinions of the value of antitoxin. The vast collections of statistics in favor of it have been almost wholly ignored, and the statements are based upon the results in a single hospital. Whatever the value of the treatment may be, this method of discussing it is far from judicial.

The section on Rheumatism, by Cheadle, is an excellent, moderate article which fairly presents the various theories of the etiology of the disease, while distinctly supporting the view of its infectious nature.

In the section on Tuberculosis, by Blumer, we should like to have seen some more extended discussion of the relative frequency of the entrance of the bacilli through the lungs and the digestive tract respectively. The matter is referred to later in an excellent contribution by Jacobi on Pulmonary Tuberculosis.

The articles on Scurvy and on Cretinism are contributed respectively by masters of the subjects—Barlow and Osler. The italicised statement that there is in scurvy no characteristic affection of the gums unless teeth have appeared is true only with exceptions, as the statistics of the American Pediatric Society's collective investigations have clearly shown.

We regret to see introduced into this volume the use of the rather antiquated term "mucus disease" as the heading of a section. The conception of this condition as an entity has been abandoned by practically all the best modern writers. Confusion, too, is produced by the application of the term to an entirely different condition in the main body of the *Cyclopædia*.

Ashhurst's advice to operate in intussusception after four to six days of medical treatment is too conservatively dangerous to represent the most widely accepted views.

The article upon Appendicitis is excellent, but something more definite about the disease as seen in children would have been of advantage; and it would be discouraging to see the diagnosis written of as so easy did we not know that many surgeons of very wide experience do not find it so.

The section on Diseases of the Liver, by Musser, is one of the most praiseworthy of the volume. It is an excellent appendix to his original article.

W. A. Edwards contributes an excellent section on Diseases of the Uterus, Vagina, and Vulva, and H. A. Kelly one equally good on Diseases of the Ovaries and Fallopian Tubes.

The article on Fractures and Dislocations is stated to be a résumé of the cases reported in the last ten years. The author begins by referring to only two cases of fragilitas ossium, whereas we know that probably a dozen have been reported during this period. It is possible that the literature of the balance of the article is more complete.

Finally, in the department of Nervous Diseases, we notice excellent papers by Mills, Sachs, Collins, Nancrede, Putnam, and others.

The volume is freely illustrated, and is terminated by a most satisfactory index.
J. P. C. G.

An Epitome of the History of Medicine. By Roswell Park, A.M. M.D., Professor of Surgery in the Medical Department of the University of Buffalo, etc. Based upon a course of lectures delivered in the University of Buffalo. Second edition, illustrated with portraits and other engravings. Pp. xiv., 370. Philadelphia: The F. A. Davis Co., 1899.

The author begins his preface with the statement that the history of medicine has been sadly neglected in our schools—a statement as melancholy as it is true. Individuals are continually met with who have a reverence for and are versed in the achievements of those who have gone before, but there are few instances of any systematic endeavor to impart any knowledge of the wonderful history of his art to the student on the benches. In institutions for the teaching of theology or law or military science there are always provisions for the instruction of the student in the history of his profession, but in few medical schools is this the case.

The sources from which a knowledge of the history of medicine could be derived are many, but possibly the most profitable is to be found in a perusal of the works of the great leaders of thought in the profession of various periods.

Dr. John Brown, the author of *Rab and his Friends*, advocated strongly that medical students should be required to study the works of the ancient physicians and to pass examinations on them. Certainly, none can doubt that not only pleasure (some might prefer to say amusement) but also profit is to be derived from the works of Paré; and the memoirs of Baron Larrey, though they are, it is true, of much more recent date, still possess real professional value as well as the most thrilling interest.

It is to be most devoutly wished that at some future time a chair will be established in every institution for the teaching of medicine whose occupant shall direct the attention of the student to those who have been epoch-makers in the upward progress of the profession, and that instead of the student having the impression that the previous history of medicine consists in a knowledge that prescriptions of the past were solely made up of snakes and frogs and other nauseating materials, he will be able to recognize for himself that many of the physicians of yore were men of much learning, and often imbued with the most scientific impulses and philosophical aims.

It is customary to lament the fact that medical nomenclature contains so many appellations which, consisting as they do of proper names, convey no meaning as to the part or organ or disease which they designate. These names represent all periods of history and most of the nations under the sun. In the nomenclature of no other science is this recurrence of proper names so frequent. To the average medical student or doctor they are an unpronounceable, readily confused, and easily forgotten jumble. Yet most of these names should conjure up the master of medicine whose fame it aids to perpetuate, and should recall to the studious the memory of the man who was the discoverer of the organ or the pioneer in the study of disease.

As things go now these weighty names represent naught. What ideas are raised in a medical student's mind when the lecturer mentions the parts named for Fallopius, Glisson, Eustachius, or Sylvius; or if he refers to the pathological conditions which bear the name of Brodie, Bell, or Colles.

He is merely struck with the burden which he bears of being obliged to couple an individual's name to something which it has, for him, no visible connection. If the study of the history of medicine were made a part of his curriculum the student would find these names, so constantly recurring, a source of aid in his studies, as they would serve to recall some interesting event in medical history related to the object of his labors, and thus render the task of connecting the object in his memory with something else more readily accomplished.

The only useful purpose that can be served by such a system of nomenclature is that of subserving historical ends, and when the latter are utterly neglected such a system is worse than useless.

Dr. Park gives a list of the principal authorities on the history of medicine of whose labors he has availed himself in the preparation of his epitome. He includes the work of Baas, which has been made known to the profession in this country by the publication of a translation of it into English. He also refers to the classical work of Bouchat.

An adequate history of medical science in the United States has yet to appear. Since James Thatcher published his sketches of *American Medical Biography*, in 1828, no book worthy the name of a history on that subject has appeared. In a prefatory chapter Thatcher outlined the history of the profession in this country from the first settlement to the date at which he wrote. The local history of medicine in Philadelphia and in Massachusetts has been carefully studied. The late Dr. Toner, of Washington, laboriously collected all the material which he could obtain bearing on the medical annals of the colonial and revolutionary periods, but the result was all contained within several small pamphlets.

Dr. Park truthfully terms his book an epitome, for it is in reality nothing more. It is, however, a very excellently compiled epitome, and Dr. Park is to be congratulated upon the judicious manner in which he has weeded out the important events in medical history from the mass of rubbish in which they lie embedded. We would heartily recommend all physicians to get this book and read it, and to have it continually at hand for reference. Where the author is compelled by limitations of space to be brief, he has usually contrived to indicate the manner in which the subject can be further pursued by those desirous of acquiring more information.

The book contains a few inaccuracies. Thus, on page 290, he speaks of Dr. Kirkbride as having been Superintendent of the Philadelphia Asylum. As everyone is aware, there is no institution bearing such a title, and Dr. Kirkbride was Superintendent of the Insane Department of the Pennsylvania Hospital. On page 279 he mentions that Benjamin Franklin, when a young man, was a violent opponent of inoculation for smallpox, but does not do Franklin the justice to say that he afterward changed his views completely and wrote a pamphlet in support of the practice, and in his *Autobiography* expresses the regret he felt, when a son of his died of smallpox, that he had not had him inoculated previous to the attack.

The author has followed the classification of the epochs of medical history which was made by Renouard, and which is perhaps as satisfactory as any that could be devised.

The book forms a handsome volume, well printed and tastefully bound. The interspersed illustrations, chiefly from old engravings and old works on medicine, are commendably chosen and handsomely executed.

F. H. P.

THE THROAT AND NOSE AND THEIR DISEASES: Being the fifth, revised, and expanded edition of *The Throat and Its Diseases*, with illustrations by the author, LENNOX BROWNE. London: Balliere, Tindall & Cox, 1898.

WE may say at once that this is Great Britain's best work upon the diseases of the nose and throat. Even when it was first published, some twenty years ago, it was immediately recognized as a most valuable contribution to the literature of this specialty, and since then each successive edition has been so great an improvement upon its predecessor that now we may regard it as *facile princeps* among the many works on rhinology and laryngology that have appeared in Great Britain during the past dozen or fifteen years. For this last edition, the fifth, the author has been fortunate in obtaining the aid of Collier, Cagney, and Wingrave, each of whom has contributed matter of much value. Just previous to his death Cagney re-wrote the chapter on the nervous affections of the larynx, and this is now one of the most interesting and profitable chapters in the book. As a matter of course, the controversy respecting the validity of "Semon's law" is given ample reference, and the subject is brought well up to date. There can be no question that the weight of evidence, both that founded upon clinical observation and that upon experimental research, is very greatly in favor of our acceptance of Semon's conclusions as opposed to those of Grossman. Now that a general and keen interest has been aroused in the matter, closer clinical study, followed by more frequent and more minute postmortem investigation, will probably lead to an early settlement of this somewhat heated discussion. To the consideration of the etiology of nasal and throat diseases has been added a brief but valuable chapter dealing with their bacteriology. This is illustrated sufficiently, and will prove an excellent guide to those who wish to increase in this way their diagnostic resources. In his chapter on diphtheria Browne is far from being enthusiastic in his approval of the antitoxin treatment. Conclusions derived from statistics and the apparently lessened mortality which they give he regards as almost valueless, because the bacteriological test has so greatly altered the former accepted proportion between the number of deaths from diphtheria and the actual number of cases of the disease. The microscope and the culture-tube now class a large number of cases as diphtheria which formerly, upon merely clinical grounds, would have failed of recognition. This question of the value of the antitoxin treatment is another of those which will require a little more time to win over the skeptic and the ultra-conservative. One scarcely cares to criticise small matters of detail in this book, because, taking it as a whole, it is so excellent. It is quite elaborately produced, the illustrations being numerous, and, as a rule, most satisfactory. It is a work that will be best appreciated by specialists, and it is to them, indeed, that its size and price will probably limit its sale. C. P. G.

THE PRINCIPLES OF BACTERIOLOGY. By A. C. ABBOTT, M.D., Professor of Hygiene and Director of the Laboratory of Hygiene, University of Pennsylvania. Fifth edition. Philadelphia and New York: Lea Bros. & Co., 1899.

A MANUAL OF BACTERIOLOGY. By HERBERT W. WILLIAMS, M.D., Professor of Pathology and Bacteriology, Medical Department University of Buffalo. First edition. Philadelphia: P. Blakiston, Son & Co., 1898.

THE PRINCIPLES OF BACTERIOLOGY. BY DR. FERDINAND HUEPPE, Professor of Hygiene in the University of Prague. Authorized translation from the German by DR. E. O. JORDAN, Assistant Professor of Bacteriology in the University of Chicago. The Open Court Publishing Company, Chicago, 1899.

ABBOTT'S *Principles of Bacteriology*, appearing in its fifth edition within seven years, needs no recommendation here.

As a student's manual of instruction, and as a techincal guide that is thoroughly up to date, it is unsurpassed; it is, too, an interesting exposé of a subject the details of which are usually tiresomely monotonous.

Williams's *Manual of Bacteriology*, in its first edition, is scarcely more than half the size of Abbott's, and, as was to be anticipated, is not such a complete or detailed exposition of the subject. Though manual in size, Abbott endeavors to make a critical study of the moot points, while Williams states only the general facts of the case.

It is impossible to find fault with the student who, with five to ten examinations before him, looks for the shortest road to the end of his subject; but this is no reason why teachers should aid him by setting before him naked facts divested of the details that make them interesting and possible of retention.

" The view prevailed in the middle ages that every sin is under the control of and operated by a particular devil; at present each disease, in a similar fashion, has its own devil in the form of a specific bacillus." This sentence, quoted from *The Principles of Bacteriology*, by Dr. Ferdinand Hueppe (translated by Dr. E. O. Jordan), probably gives a better idea of the nature and purpose of the book than a lengthy criticism. He starts out his preface with " Bacteriology is just now in transition from the natural history stage to the scientific," and he acknowledges that he leaves the former aspect of the question to be dealt with in text-books and manuals generally, while he devotes himself entirely to the scientific consideration of the subject. His development of this theme consists in a monograph disproving the specificity of the microbe in the production of disease. He insists "If pathogenic bacteria are the true and sufficient cause of disease, as Pasteur and Koch have affirmed, then at least four conditions would have to be fulfilled. First, the disease-producing bacteria should exert no other effect than that of producing disease; second, their ability to produce disease should remain constant; third, they should affect all animals in the same way without reference to particular species; and, fourth, they should produce only a single, sharply defined, typical and 'specific' infectious disease. All four of these assumed essentials he easily disproves."

As he denies the specific cause of disease to lie in the microbe, he insists also that it is not in the cell, as presented to us by Virchow's pathology, nor yet again in Pettenkofer's predisposition, but in the dynamical energy dormant in the protoplasm of the body and set free by what he terms "liberating impulses," under which he would include microbic agencies. He draws a simile to explain this in a weight held by a string or a support. The weight possesses in itself the potential energy capable of producing a certain effect. It will be the cause of the effect, yet it cannot act until the support is drawn away or the string cut; but the liberating agencies by which the potential is changed into kinetic energy are only adventitious, even though necessary, antecedents, and can never be called the specific causes of the effect.

The exposition of such a question in a few lines scarcely does justice to it, because with the opportunity to illustrate and compare it is by no means so indefinite as this rendering makes it; but, granting that this unnecessarily profound explanation is nearer the exact truth, and that we are using the words predisposing and exciting causes out of their absolute meaning, it is still to a great extent a question of terminology, and it is impossible for him to avoid introducing as the essential initiatives the bacteria, determining at least the direction of the cause, and the predisposition permitting the bacteria to act.

Besides denying the specificity of the microbe, he denies a specific action on the part of any of our so-called specific remedies. Quinine, mercury, antitoxic serum, he endeavors to prove, exert their power by stimulation of the body cells, not by their antiseptic or germicidal action on the microbe or anti effect on the toxin. It is unnecessary, he affirms, to suppose in the body an antitoxin in cases of tolerance to a poison; in habituation to alcohol no anti-alcoholin is found; in habituation to morphine no anti-morphine, and yet a tolerance to these poisons is established apparently by intervention of the body cells.

On the whole, the book is one of a reformer with a reformer's dogmatic overzealousness. Like the majority of reformers, his general idea is in the right direction—namely, toward more serious exactitude in work and greater accuracy of expression. We are using our terms too loosely, and though we claim to be scientific, we are too often satisfied with the merest superficialities instead of prosecuting our investigations to the depth where the true science is to be found.

Hueppe's book has no claim on the student; in the present problematical state of our knowledge his explanations would obscure in place of clearing up; but to a scientific man there is much that would commend itself, and all would interest and profit. The translation of it needs no apology; we have too few books of this character in English medicine. J. W.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Asthenic Paralysis, Albumosuria, and Multiple Myeloma.—SENATOR (*Berliner klin. Wochenschrift*, 1899, No. 8) describes the following rare and interesting case: The patient, a merchant's widow, came to the hospital in February, 1897, with symptoms thought to be those of nephritis, albumin, casts, and epithelial cells being found in the urine. She returned early in March in a worse condition, complaining of pain in the head, back, and legs, and of weakness. Large quantities of albumose were at this time first demonstrated in the urine. She was weak and anæmic, walked with a creeping motion, and complained of a difficulty in swallowing, which so interfered with her nourishment that she became so weak as to be unable to walk. There was no swelling of the glands and no fever. Examinations of the organs of the chest and abdomen were negative. The signs on the part of the nervous system were very striking. There was paralysis of the tongue, which graduallv became complete. The patient could neither move the tongue in the mouth nor protrude it, in consequence of which swallowing was difficult, and it was necessary to take nourishment through a tube. The chin felt as if it were dead. There was an anæsthetic zone in which all sensations were absent, extending from the under lip to the chin, 2½ cm. broad. The vocal cords moved fairly well, but there remained a slit in the rima glottidis as a result of paresis of the arytenoid muscles. The other cranial nerves showed no disturbances. The pupillary reflex was good, the fundus of the eye showed no abnormality except pallor. The pharyngeal musculature showed no disturbance. The legs were not atrophied nor paralyzed, but there was great weakness and sensitiveness of the left peroneal and tibial nerves. The patellar reflexes were increased. The blood-corpuscles were pale, but otherwise not remarkable. The tongue showed no distinct atrophy, but in the middle there was often fibrillary twitching. Electric tests revealed a diminution of the faradic and galvanic excitability of the hypoglossal nerve. In direct irritation with a strong current there was distinct twitching, never a reaction of degeneration. All of the muscles of the face and legs gave normal electric reactions. The rapidity of the pulse was striking during the entire illness, running between 84 to 100—mostly 90 to 96. Notwithstanding feeding by stomach and rectal tube, the patient gradually sank, complained of weakness, insomnia, dyspepsia, pain in the chest and back. For a few days there was slight improvement in the paralysis of the tongue. Meanwhile a gangrenous phlegmon developed in the left gluteal region. Death occured suddenly before an operation could be performed. The symptoms could not be satisfactorily explained by a central cause; hysteria was excluded, and a peripheral cause, often searched for, could not be discovered. On account of the albumosuria, osteomalacia was thought of, but no evidences were present in the skeleton. The post-mortem findings were as follows: Multiple myelogenous round-cell sarcoma of the ribs, double-sided fibrinous pleurisy; broncho-pneumonia of both lower lobes; chronic parenchymatous nephritis with amyloid degeneration; gangrenous phlegmon of the left trochanteric region. The cranial bones and the brain showed no abnormality; the medulla exhibited an irregular distribution of the nuclei; the spinal cord was thin and narrow. The hypoglossal nerves and the lingual muscles gave no explanation of the paralysis.

Senator gives a brief review of our knowledge of multiple myeloma, of the relations of bone-marrow disease to anæmia, and of anæmia to alterations of the spinal cord, and then states his belief that in his case the multiple myeloma led to albumosæmia and albumosuria, with injury to the kidneys, on the one hand, and on the other to severe anæmia, and, on account of a congenital predisposition, an asthenic paralysis.

[The explanation might have gained much in force if the condition of the blood and the spinal ganglia had been more thoroughly investigated.—Ed.]

Tabes Following Trauma.—Trömmer reports two cases with reference to the relation of trauma to tabes dorsalis. Case 1 was a laborer, aged forty-two years, a moderate drinker, giving no history of syphilis, and healthy until he received a severe contusion of the left foot, followed by swelling, pain, and paræsthesia. Eight weeks later there was deficient erection and slight difficulty in urination. Nine months later there were lancinating pains and weakness in the affected foot. A year later the patient noticed tingling and weakness in both legs. From this time the tabes pursued its usual course. On examination it appeared that the movement of the left foot was diminished about one-third; the circumference of the left calf was 1 cm. less than that of the right; the pupils were unequal and did not react to light; on looking to the left there was slight nystagmus and diplopia; the movements of the head and trunk were weak and trembling; the strength of the limbs diminished; that of the legs more than the arms, and on the left side more than on the right. The tendon reflexes of the arms were retained, though diminished, especially in the left. The muscles of the left leg were more hypotonic than those of the right; the tendon reflexes of the legs were lost. Of the skin reflexes the plantar was lost, and also the left testicular and the left abdominal reflex diminished. The ataxic disturbances were more decided on the left side. The patient could touch the tip of his nose with the right hand, but not so accurately with the left. The knee-jerk was decidedly more uncertain left than right. Romberg's phenomenon was marked. The asymmetry of the sensory disturbances was striking. It became more marked on nearing the place of injury, so that it was stronger left than right, in the leg than in the arm, and strongest in the left foot. The hemianæsthesia was combined with a hyperæsthetic trunk zone extending between the third rib and the crest of the ilium. On the right side the sensibility for touch, pain, cold, and heat was somewhat diminished in this trunk girdle, less so in the foot. On the other hand, the entire left side below the neck showed diminished sensibility, the leg more than the trunk zone, increasing in every way to the non-sensitive left foot. The sense of position was disturbed in the left little finger and legs, abolished in the great toe. The predominance of all symptoms, motor, reflex and sensory on the side and at the point of injury, was marked, a fact which has not yet been demonstrated in non-traumatic and seldom in traumatic tabes. Among sixty cases of tabes Lähr found only one case with striking asymmetry in its sensory symptoms, and this case was combined with another neurosis. In this case the relation of the trauma to the tabes would seem clear, were it not for the fact that the patient's wife had been twice in an insane asylum, and at the time of writing had psychic symptoms with absent pupil, reflex and knee-jerk. The possibility of syphilis can therefore not be excluded.

In the second case the relation of the trauma—a fall—to the tabes was even less certain, but the ataxia and hypalgesia were more marked on the side of the lesion. In both cases the occurrence of symptoms of tabes began comparatively soon after the injury, a point the author considers important. He is inclined, in such cases, to call the trauma the exciting cause in the sense of the German insurance system.—*Berliner klin. Wochenschrift*, 1899, No. 7.

Glycosuria in Cholelithiasis.—KAUSCH (*Deutsche med. Wochenschrift*, 1899, No. 7) found in the material of the Breslau surgical clinic during the past eight years eighty-five cases of complicated and uncomplicated cholelithiasis. Seventy of these cases underwent operation. In all of them the urine was examined, and especially for sugar. In only one was sugar found. This is in striking contrast to the results obtained by Exner, who believes that in all cases of gallstone disease there is an increase in the amount of sugar in the urine, independent of the position of the stone or the presence or absence of icterus, and that it disappears three to four weeks after operation. The author's results agreed with those of Naunyn, who in 250 cases of gallstone colic never found glycosuria except in cases of complicating liver disease. The case of glycosuria mentioned by the author was in a woman fifty-six years old and moderately well nourished. For seven years she had had typical attacks of gallstone colic. In one of these attacks, two years previously, sugar was found. The last attack had occurred fourteen days prior to the examination. The liver was not demonstrably diseased, the spleen was not enlarged, and there was no icterus. The quantity of urine in twenty-four hours amounted to 900 cc.; specific gravity, 1025; no albumin. The sugar varied from 1½ to 3, or on one occasion 5 per cent. Kausch subjected Exner's paper to a very searching examination, and found that his method of examination of the urine was open to severe criticism. Exner stated that in his cases of cholelithiasis he could observe a distinct reduction, much more marked than in normal urine, apparently forgetting that this slight reduction might be effected by kreatin, kreatinin, uric acid, allantoin, traces of grape sugar, and other substances. Exner employed Trömmer's test, Nylander's, the fermentation test, polarization, and the phenyl-hydrazine test, but without regard to the source of error. Strauss suggested that incarceration of the gallstone in the diverticulum of Vater compresses the pancreatic duct, and thus produces glycosuria. The author, however, had in his series one such severe case of incarceration without glycosuria.

In a later number (11) of the same journal Exner clears up some of the points criticised, and Czerny as surgeon pleads for a further investigation of the subject.

The Color-reactions of Diabetic Blood.—HARTWIG (*Deutsche Archiv für klin. Med.*, Bd. 62, p. 287) has made some interesting experiments which increase our knowledge of this subject. He concludes that Bremer's reaction always occurs in diabetes mellitus; that it occurs at times in other diseases, and that an explanation of this fact is not yet available; the reaction is a chemical combination of the dye with hæmoglobin; grape-sugar is one of the causes of the reaction, but it is not improbable there are other things that can produce similar changes of the hæmoglobin; the concentration of a grape-sugar solution that will produce the reaction in pure hæmoglobin must be at least 0.15 to 0.2 per cent. The most important fact brought out by the experiments is that hæmoglobin, the oxygen carrier, undergoes a chemical change in diabetes mellitus. It was already known that in this disease the oxidizing power of the blood is reduced only as regards grape-sugar and not to other substances, even those difficult to oxidize. The change, now shown to exist, is therefore rather a symptom than a cause. The article is noteworthy in showing how a method originally advanced as an empirical one may lead to interesting scientific facts and theories.

A Case of Spastic Spinal Paralysis, with Recovery, Following Influenza.—L. MICHAELIS has found in literature five cases of myelitis following influenza. He adds to these the following case: A boy, thirteen years of age, who was never sick before, and was without hereditary taint, complained of headache, slight fever, cough, and running at the nose. The disease was diagnosed influenza. He was confined to bed a week. On his first attempt to rise he found that he could not walk; his legs were stiff and closely adducted, and there was spasm, first in the right then in the left leg, which became stronger. Subjective symptoms were absent in both legs, and there were none on the part of the bladder or the rectum. On examination, about eight weeks later, all the organs except those of the nervous system were negative. The legs were adducted and only separated by considerable force. The right foot was flexed and supinated, presenting pes equino-varus. The adductors of both thighs were hard and rigid. The patient could walk only with assistance, the gait being spastic and paretic in type. The knees were flexed, the steps small, and the feet lifted only a little from the ground. As the patient lay in bed frequent spasm was seen in the muscles of the lower extremities. There was no atrophy of the muscles, and neither nerve-trunks nor muscles were painful to pressure. The patellar reflexes on both sides were strongly increased, while other reflexes were normal. There was no ankle clonus. The upper extremities were normal, and there was nothing pathological in the cranial nerves. The senses of touch, pain, temperature, and position were intact. There was no ataxia; the movements of the eyes, pupillary reflexes, and the eye-grounds normal. Urine and feces were passed voluntarily. After four to five weeks treatment with potassium iodide, warm baths, and galvanization there was distinct improvement. By the end of ten weeks he had fully recovered. In deciding upon the cause of this disease the author excludes spinal hemorrhage and hemorrhagic myelitis, tumor and primary lateral sclerosis, and concludes that an acute myelitis following influenza accounts for all the clinical phenomena. Numerous other diseases of the central nervous system have been found to follow influenza, and, as a rule, have a relatively good prognosis. Leichtenstern especially has reported a great number of nervous diseases following the epidemic of influenza in Cologne, such as monoplegia and hemiplegia, meningitis, and especially hemorrhagic encephalitis. Pfuhl demonstrated the influenza bacillus in seven cases of cerebro-spinal meningitis following influenza. In the above case the recovery excludes a severe anatomical lesion of the spinal cord, and the author considers more probable either a circumscribed inflammatory process or a toxic functional disturbance, the toxic process being made probable by Breiger's observations on a case of spastic paralysis in lead-poisoning.—*Deutsche med. Wochenschrift*, 1899, No. 7.

The Diazo-reaction and its Clinical Significance.—M. MICHAELIS (*Deutsche med. Wochenschrift*, 1899, No. 10) contributes a valuable paper upon this reaction, in which he confirms the work of Ehrlich, first published in 1882. The number of cases examined was very large. Some of the results were as follows: By far the greatest number of cases in which the reaction was found belonged to the class of infectious diseases. The diazo-reaction is entirely independent of rise of temperature. There are infectious diseases with absolute freedom from fever—as tuberculosis—which give an intense diazo-reaction. On the other hand, in acute infections, such as influenza and pneumonia, with high temperature, up to 40° C., no suggestion of the reaction was found. In the same disease the temperature and the diazo-reaction did not, as a rule, have parallel curves. The temperature can rise and the diazo-reaction disappear, and the reverse can happen, as in collapse. While, as a rule, an increase in the diazo-reaction is associated with an advance in the degree of the infection, yet in fatal cases it may disappear in one to two days before death. The author divides diseases into four groups, depending upon the presence and the time of appearance of the reaction. Group 1 includes those affections in which the reaction is very seldom found—*i. e.*, chronic organic diseases, such as nervous diseases, mental diseases, affections of the spinal cord, chronic heart and kidney diseases, gout, diabetes, syphilis, malignant tumors, etc. If the diazo-reaction happens to be present in these cases the author believes there is a secondary infection, such as an ulcerating carcinoma and similar processes, with bacterial infection. Group 2 includes those cases in which the diazo-reaction is nearly always present, and in most cases is found in the beginning of the disease. Typhoid fever and measles especially belong in this class. The presence of the reaction in these diseases is of great diagnostic value. In typhoid fever, between the third and seventh days, when perhaps the rose-spots are absent, and there is no enlargement of the spleen, and in place of the typical pea-soup stools there is constipation, the slight evening fever and feeling of malaise only suggest typhoid, while a distinct diazo-reaction makes the diagnosis certain. By noting the increase, the diminution, or subsidence of the reaction it is possible to follow the course of the infectious process. This is of great significance, because while the fever is still in the stage of acme the reaction may disappear three to five days before the beginning of the decline. In a case of typhoid fever seen for the first time on the ninth to tenth day, in which the diazo-reaction is absent, it can be said that the infection has begun to disappear, and that it will run a mild course. If, on the other hand, the reaction continues for a long time, or its intensity increases during the course of the disease, the prognosis is much more serious. The reaction is also of value in diagnosing a relapse. By its presence on the first day of the return of the fever it is possible to make a certain differential diagnosis between a recurrence and a secondary fever brought on by other causes. The diazo-reaction is present in the majority of cases of measles in the beginning of the disease, and by its increase or disappearance it is possible to measure the course of the disease. It is of service in differentiating rubella from morbilli, as it is not present in the former. Group 3 includes such diseases as scarlatina, erysipelas, sepsis, pyæmia, pneumonia, and diphtheria, in which the diazo-reaction is only occasionally present. The increase or decrease in its intensity gives a criterion as to the course of the disease. If it is present in pneumonia or diphtheria, which is rare, it indicates that the case is a grave one, or that there are complications. In operations on empyema and pyæmic processes the continuance or disappearance of the diazo-reaction affords a valuable and early proof of the success of the surgical procedure. Because of its special significance phthisis is placed in a group by itself. The author states that if he has a consumptive whose urine gives a striking diazo-reaction he considers that he has to deal with a very extensive disease process, or that the phthisis will run a very rapid course. The majority of these cases will die in less than half a year. Fraenkel considers the diazo-reaction one of five diagnostic factors in acute caseous pneumonia. The author places all cases of tuberculosis giving the diazo-reaction in the third stage. He emphasizes the great practical value of this fact, and would make it a rule to exclude all tuberculous patients giving the diazo-reaction from sanitoria in which improvement or complete healing are expected. The question as to the nature of the body that gives the reaction is still unsolved. It resists boiling, and can be preserved for a long time in urine which has been evaporated to a syrupy consistency. There are a number of substances in the urine which give a reaction very similar to that of Ehrlich. These always require a stronger solution of the reagent or a greater alkalinity of the urine. If Ehrlich's directions are followed it is possible to exclude color reactions by such bodies as sugar, acetone, and medicines (with the exception of naphtalin).

[Observations carried on for eight years in the editor's clinic confirm the author's statement, especially with regard to tuberculosis.—G. D.]

Bacillus Icteroides and Bacillus Choleræ Suis.—REED and CARROLL (*The Medical News*, April 29, 1899, p. 513) in the course of a comparative study of bacillus X (Sternberg) and bacillus icteroides (Saranelli) also observed the effect of the intravenous injection in dogs of the bacillus coli communis and the bacillus choleræ suis. They found that the same clinical symptoms—viz., vomiting, increased action of the bowels, and profound prostration—which are produced in dogs by the intravenous injection of B. icteroides are also brought about by a like inoculation of the hog-cholera bacillus. The anatomical changes were similar with both organisms, but in neither instance was the degree of fatty degeneration at all comparable with that present in the human liver in yellow fever. The results of inoculations of guinea-pigs, rabbits, and pigeons with these organisms and the feeding of them to hogs were similar in both cases. An important point in their work was the observation that the serum of an animal immunized with B. icteroides had a marked agglutinative action on the hog-cholera bacillus. The cultural characteristics of the two organisms were almost identical.

As a result of the striking similarity in the cultural characteristics of the two bacilli and of their pathogenic action on various animals, Reed and Carroll believe that the B. icteroides (Saranelli) is a variety of the hog-cholera bacillus, and should be considered only as a secondary invader in yellow fever. They find that the bacillus X (Sternberg) shows marked differences from the above-mentioned organisms, both as to its biological character and its pathogenical action toward animals. They are of the opinion that the bacillus X should be placed with the colon group.

PEDIATRICS.

UNDER THE CHARGE OF

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The Distribution and Origin of Tuberculosis in Children.—LEONARD G. GUTHRIE (*The Lancet*, February 4, 1899, p. 286) has tabulated his notes on seventy-seven post-mortem examinations made on children dying from tuberculosis in the Children's Hospital, Paddington-green, during a period of eight years. The following conclusions are given:

1. The thoracic tuberculosis in children is more common than abdominal in the proportion of three to two. 2. Tabes mesenterica as a cause of death

in young children is practically unknown. 3. The preponderance of thoracic over abdominal tuberculosis is not necessarily and solely due to the direct entry of bacilli into the air-passages. In addition to this mode of infection the lungs may be affected (*a*) by bacilli entering the thoracic glands through the lymphatics of the pharynx, tonsils, and œsophagus above, and through the lymphatics of the intestines and the abdominal glands below; and (*b*) by the entry of bacilli through the thoracic ducts into the pulmonary circulation via the right heart. 4. Primary infection through the alimentary tract does not prove that food has been the sole source of evil. Therefore tuberculosis in children is not likely to be materially checked by purification of the milk-supply alone. 5. The alleged increase of tuberculous meningitis of late years is probably due to pulmonary tuberculosis set up by severe epidemics of measles.

A Rare Complication of Measles.—VON STARCK (*Jahrbuch f. Kinderheilkunde*, Bd. xlvii., S. 2) records a case of severe measles in a girl, aged eight years, in which on the second day of the eruption marked symptoms of spinal meningitis and irritation of the nerve-roots made their appearance. Full recovery followed in about three weeks. No other cause but the measles could be determined; the child had been previously perfectly healthy and had sustained no injury. Similar cases have been observed after scarlatina and typhoid fever, but they are extremely rare after measles. Lumbar puncture was not performed in view of the rapid and favorable course of the disease.

Extract of Whortleberry in the Treatment of Eczema.—DAXENBERGER (*Centralblatt f. Kinderheilkunde*, 1898, iii. 439) speaks very favorably of this drug in various forms of eczema, especially in children; also in the mycotic forms in smaller ulcerations of the skin and mucous membranes, rhagades, etc. The extract, of the consistency of syrup, is applied by means of a brush after the surface has been cleansed and dried. Over this a dusting powder may be sprinkled. Drying takes place rapidly, and the pellicle adheres so tightly that other dressing is unnecessary. By this means eczema was often cured in one to two days.

Anuria in Diphtheria.—BRAUN and THIRY (*Société de médicine de Nancy*, February 22, 1899) report the case of a child, aged six years, suffering from strepto-diphtheria, in which an injection of 18 cc. of antidiphtheric serum was immediately followed by total anuria, which lasted until death, thirty-two hours afterward.

The autopsy showed, beside the ordinary alterations encountered in diphtheria, profound lesions of the kidneys (hemorrhages, vaso-dilatation, glomerulitis, and intense nephritis), Loeffler bacilli, streptococci, and staphylococci in all the organs and in the blood.

The authors consider the anuria due to profound alterations of the kidneys resulting from the disease and not directly attributable to the serum, which, however, must be regarded as a determining cause where other conditions were favorable.

The Etiology of Black Tongue—WM. S. GOTTHEIL (*Archives of Pediatrics*, April, 1899, p. 255) reports an instance of this rather rare affection in a boy aged two years. The child had always been perfectly healthy except for the affection of the tongue, which had first been noticed at the age of one year. The mother had taken him to a physician at the time, and he was given some medicine which cleared off the deposit in a few days, but it had soon returned. The centre of the dorsum of the tongue was occupied by a dark, greenish-black streak, commencing abruptly immediately in front of the circumvallate papillæ, and extending down almost to the tip. It was about three-fourths of an inch wide posteriorly, narrowing gradually toward the anterior. The rest of the tongue and the mucosa of the mouth were normal. The black streak was slightly elevated, its surface looked gelatinous, and it ended in rather an abrupt margin on either side, the rest of the dorsum being not even coated. There was no apparent papillary hypertrophy, and none of the thread-like excrescences which had been noted in so many of the recorded cases, from which the name of hair tongue or black-hair tongue has originated.

Scrapings of the streak examined under the microscope revealed (beside normal epithelial cells of various kinds, detritus, and some small round spore-like bodies) masses of large irregularly oval, semi-transparent bodies showing a faint gray color under the lens. There were no pigment granules either in them or in the surrounding fluid. Their grayish color was hardly apparent with the one-tenth immersion, but was plainly discernible with the quarter-inch objective. These cells were unconnected with one another, were not arranged in series, and there was no mycelium. Some of the oval bodies showed buds, but none of the specimens examined showed cells in active proliferation.

The discoloration disappeared in about a week under the use of a mouth wash of a saturated solution of hyposulphite of soda.

The case differs from the earlier recorded cases of black tongue, in which the hypertrophy of the filiform papillæ was a marked feature. Later observers, however (notably Ciaglinski and Hewelke and Sendziak), have described cases in which the papillary hypertrophy was absent. The two former also described a parasite similar to the one observed in Gottheil's case, which they believed resembled the mucor rhyzopodiformis. Parasitic fungi agreeing in morphological appearances with those above described were also found by Dessios, Laveau, Lancereaux, Schech, Gubler, Gundobin, and others.

The affection is apparently quite harmless, save for the slight discomfort it occasions.

Acute Nephritis in an Infant Probably Due to Saccharin—G. A. HIMMELSBACH (*Buffalo Medical Journal*, June, 1899) reports a case of fatal acute nephritis in a baby of fourteen months which he attributes to saccharin used as a sweetening ingredient of its food. The child had been breast-fed until one year old, and then the breast-feeding was supplemented by several feedings of a preparation of cow's milk, consisting of milk, cream, crystal water, and saccharin, the proportions being varied as the child grew older. He had been perfectly well until a few days before death. Five days before the baby was first seen by the reporter, which was only twenty-two hours before death, the breast supply had been completely stopped and the milk mixture had been given exclusively. The baby died in coma, and the cause of death was not known until after the autopsy. Urine removed from the bladder at this examination showed the presence of a large proportion of albumin, with hyaline, epithelial, and granular casts, leucocytes, and red corpuscles. Sections of the kidney showed the lesions of acute parenchymatous degeneration.

The use of saccharin had been begun at the age of two months, being then added to its drinking-water, and the drug was administered uninterruptedly until death at fourteen months. During the last two months this substance was added to the artificial food as well as the drinking-water. At first the amount averaged one-sixth of a grain per diem, but it was gradually increased until finally at least four or five-sixths of a grain were given daily.

It is known that saccharin is absorbed as such, and is eliminated unchanged by the kidneys, but up to the present time the few observations of the action of this drug upon man have been confined to a few days of administration, and have shown no distinct effect upon the kidneys. The author believes, in the absence of any other discoverable cause, that the prolonged excretion of saccharin by the kidney was directly responsible for the renal degeneration in this case.

Rubeoliform and Other Eruptions, with Special Reference to Koplik's Phenomenon.—J. SOBEL (*Medical Record*, June 3, 1899, p. 781) gives noteworthy conclusions in regard to the value of Koplik's sign in diagnosis.

It is not uncommon for the initial symptom of influenza to suggest measles. In the presence of such symptoms the absence of Koplik's spots excludes measles; in the absence of any symptoms the presence of this phenomenon proves the case to be a beginning of measles. What is true of influenza holds good for coryza, tonsillitis, bronchitis, febricula, etc.

German measles cannot be excluded more satisfactoily than by the absence of Koplik's spots. The moderate elevation or absence of elevation of temperature, the lack of proportion between the cutaneous outbreak and the general symptoms, the non-existence or mildness of coryza, the lighter color, smaller size, and more concentric character of the eruption, the soft-palate eruption of Forchheimer, and the enlargement of the glands behind the sternomastoid are all of inferior worth, he thinks, as differential factors when compared with these spots He has seen a number of cases of German measles in which rubeola was excluded by the absence of this sign, and the diagnosis substantiated by the failure of any subsequent symptoms of measles. The fact of second attacks of true measles, which has long been accepted by clinical observers, has received peculiar confirmation from the recent observations of Knöspel, of Prague, who has diagnosticated a second attack of measles in the same patient by the presence of Koplik's spots. It is thus seen that in the subsequent as well as in the initial attack of measles Koplik's spots are present. The presence of the spots has also made possible the diagnosis of a measles eruption from the morbilliform eruption which occasionally follows from four to six days after the administration of diphtheria antitoxin. Le Fetra (*Medical Record*, October 8, 1898) has reported a case of measles complicating diphtheria for which antitoxin was adminstered, and the presence of Koplik's spots rendered the diagnosis of measles positive and excluded antitoxin rash.

Cases of erythema multiforme (papulatum, annulare, and gyratum), which frequently begins upon the face, and is accompanied by fever, headache, muscular and joint pains, and malaise, can be definitively distinguished from measles, according to Sobel, by the absence of Koplik's sign. Urticarial eruptions, especially when of the erythema-multiforme type, if considered in conjunction with their sudden appearance, the greater elevation of the lesions, their ephemeral character, the presence of itching, the lack of general symptoms, and, above all, the absence of Koplik's spots are readily distinguished.

Generalized vaccinia, of the urticarial and erythema-multiforme character, and violent cases of miliaria can be readily differentiated from measles by the absence of this sign.

Macular syphilide may at times be confounded with measles. The author has reported such a case in a boy, aged fifteen years, in whom all thought of syphilis was dispelled by the presence of Koplik's spots.

The value of the sign has also been tested in cases of drug eruptions caused by copaiba, antipyrin, quinine, bromides, and iodides.

Very puzzling conditions are sometimes presented when measles impresses or engrafts itself upon pre-existing skin lesions. The author reports a case of papular eczema in which a marked inflammatory change had suddenly occurred in the eruptive lesions. The rectal temperature was found to be 105°, but the catarrhal symptoms were slight, and the diagnosis uncertain but for the discovery of Koplik's spots.

Knöpsel has recorded instances of double infection with measles and scarlatina in which Koplik's sign was discovered five days before the eruption of measles made its appearance. The isolation of these cases, it is said, prevented an epidemic of measles in the scarlet-fever pavilion.

The sign would also be of great value in differentiating the rare condition termed erythema enematogenes from measles, which it is said it occasionally resembles.

SURGERY.

UNDER THE CHARGE OF

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The Reconstruction of a Perfectly Functionating Anal Sphincter from the Levator Ani and Glutei Muscles.—LENNANDER (*Cent. f. Chir.*, June 24, 1899) has devised an original and successful operation for the restoration of the anal sphincter in a case in which it had been destroyed by a phlegmonous ulceration which originated in the ischio-rectal spaces and left the patient without the power to retain either flatus or feces, even when astringents and opiates were employed. The opening into the rectum readily admitted three fingers, and electrical stimulation failed to reveal any contractility of the anal sphincter. Subsequent examination, after a successful operation had been performed, showed a local anæsthesia in the area about the anus and in the mucous lining of the gut, which made it highly probable that the nerves had been destroyed as well as the muscle.

Finding no analogous or similar cases reported in literature, he determined to construct a new sphincter, employing for this purpose the levator ani muscles, which have been shown to have the power of contraction in a manner similar to the anal sphincter. After careful dissections of the male perineum and a study of the possible operations he performed the following, with results that were all that could be desired, as the patient secured perfect control over both flatus and feces, even when the latter were liquid:

An incision followed the line of the sacrum and coccyx to the tip of the latter bone, and then took a horseshoe-form about the rectum. The posterior portion of the levator ani and the anterior portion of the coccygeus were laid bare by dissecting back the glutei from their median origin. The levator ani muscles were freed from the coccyx and coccygeal muscles, although the separation was not made completely to the margin of the pelvis, as it would have interfered with the innervation of the muscles by dividing the nerves which are found there springing from the sacral plexus. These portions of the levator ani were carried on either side of the rectum, and fixed to the anus in such a manner that their contraction produced a constriction of the rectum. The median portion of both glutei muscles were separated from the tubero-sacral ligament, the sacral bone, and the coccyx, and used to fill the defect in the pelvic floor caused by the displacement of the levator ani muscles. They were united in the median line with each other, with the levator ani muscles, and with the skin of the anus. The after-treatment consisted in electrical stimulation and the use of small enemata to accustom the rectum to retain its contents.

The Prevention of Thrombosis in the Veins of the Lower Extremities after Operations in which Rest in Bed for a Long Period is Necessary.— LENNANDER (*Cent. f. Chir.*, 1899, No. 19) cites a number of cases in which thrombosis of the veins of the lower extremities has occurred while the patient was confined in bed during a convalescence from a serious operation or a protracted illness. In some of the cases death resulted from the passage of an embolus through the heart, or serious complications were the result of its entrance into the lungs. He has studied carefully the conditions under which the thrombosis has taken place, and has come to the conclusion that it is not the result of the diseased condition *per se*, but of the lowered blood-pressure and anæmia that result, and the retardation that takes place in the venous circulation on account of the position in which the patient is placed by the necessity for absolute rest in a recumbent position. He believes that it is possible, in the majority of cases, to prevent thrombosis of the veins in the lower extremities by raising the lower end of the bed upon blocks of wood, thus assisting the flow of blood back to the heart. There are, of course, other things to be attended to. The patient's nutrition and the blood-pressure must be increased by appropriate tonic treatment, while constriction of the veins must be avoided.

The raised foot of the bed is also to be recommended in other conditions in which thrombosis may occur besides those following surgical operations, as in purely medical cases, such as anæmias, and in all conditions where there is an altered condition of the blood in which not infrequently thrombosis develops. He gives as instances typhoid fever, chronic enterocolitis, and peritonitis, that recover without operative interference.

Sealing of Operative Wounds About the Abdomen.—Bishop (*Medical Chronicle*, April, 1899), in dealing with the treatment of abdominal wounds by drainage, shows that these drains have frequently been the entrance through which bacteria have penetrated into the abdominal cavity and produced septic processes, and even death. He believes that the peritoneum is itself capable of destroying a certain number of bacteria, and that in cases that are not previously septic, where asepsis is employed with rigor, and we are certain of our technique, it is unnecessary to provide drainage. In addition to forming the avenue through which infection may enter the abdomen, glass drainage-tubes have been known to produce serious injury to the granulations that have formed about them, or to masses of granulation that have penetrated and filled their lumen from below. In addition to all these dangers, the drainage-tube has frequently been the etiological factor that has resulted in a ventral hernia by weakening the scar. Further autopsies have frequently shown that drainage-tubes do not drain, as collections of pus have been found close to the tube after the death of the patient. The revolution in our knowledge regarding the value of the fluids secreted in the wound, in contrast to their harmfulness, makes us all the more willing to do away with these tubes and exclude the bacteria. The first dressing of a wound is a bugbear, because infection of an aseptic wound has so frequently taken place at that time. This is avoided, the author believes, by employing an occlusive dressing in the beginning. He employs a celloidin dressing, which, in addition to being transparent, has a tendency to contract the skin and vessels immediately around the line of union, so limiting the tendency to overfulness of these vessels after any traumatism. The formula which he employs is the following:

Celloidin	1 part.
Abs. Aeth. Sulph.	āā 4 parts.

It is a clear fluid, and requires to be kept in a cool place and in a well-stoppered bottle. It is applied with a brush to the absolutely dry surface it is intended to cover. In order to obtain such dryness it is well to wash the part quickly with ether. It causes contraction, and the part may sink below the surrounding. About the ninth or tenth day the edges become loose, the central part still remaining firm. By the twelfth day it will be cracked. The sutures are all that hold it, and they should be cut close to the knots, which can be readily seen through the film. Generally a second application is unnecessary. This application is especially valuable in children, since it is difficult to make them leave the dressing alone, and there is danger of soiling.

A New Absorbable Ligature Material.—Sneguireff (*Cent. f. Chir.*, June 17, 1899) reports the clinical results of his experience with a new absorbable ligature and suture, which he finds to be absorbed a little more slowly than catgut, but to be capable of absolute sterilization. The ligature is made from the ligamentum nuchæ of the reindeer by dividing it in the direction of its fibres. The process of preparation is the following: Removal of fat in ether, soaking in juniper oil for fourteen days, removal of oil with ether and alcohol, soaking for two days in a ½ per cent. sublimate solution in 80 per cent. alcohol, finally two days in normal sterile salt solution; preservation in alcohol. Bacteriological examination and the clinical test of eighty-three major operations have proved the absolute sterility of this material, and that it is absorbed as soon as is desirable.

Formalin in the Surgical Treatment of Tuberculosis.—Hahn (*Cent. f. Chir.* June 17, 1899) reports some very interesting results which he has obtained by the substitution of formalin for iodoform in glycerin in the treatment of tubercular arthritis and tubercular abscess, and even in tubercular empyema of the pleura.

His series of clinical experiences has extended over a period of two years, and the results have been highly satisfactory. He employs one to five parts of a 35 per cent. solution of formalin in 100 parts of glycerin, injecting into a joint, after it has been aspirated and washed out with boric acid solution, one-third to one-half the amount of the formalin mixture that there was of pus before aspiration. The limb is put at rest. Then follows an elevation of temperature and marked reaction, with swelling and an amount of pain that sometimes demands morphine. The reaction subsides in a few days and the swelling decreases. At the end of two weeks it is well to repeat the injection where possible. Complete healing occurs after a short time, with restoration of function.

Where there are caseous granulation masses that are not broken down and cannot be aspirated at first, it will be found that the glycerin and formalin will break them down, and that at the subsequent aspiration they can be washed out.

The Excision of Hemorrhoids.—Reinbach (*Beiträg. zur klin Chir.*, 1899, Band xxiii., Heft 3) has studied the comparative results of excision and other methods as employed in Mikulicz's clinic. He finds the excision method to be almost ideal; the entire pathological area is removed; a rapid healing by primary union is secured with a linear scar. The patient is, in fact, returned to a normal condition. The v. Langenbeck operation has been followed by good results, except in four cases, where other intercurrent conditions have decreased its efficiency; in one case a relapse was certainly present. The excision method is to be most warmly recommended, and the author hopes that its employment may be generally adopted.

On the Sterilization of Catgut.—DARLING (*Journal Boston Society of Medical Sciences*, May, 1899) has made a series of interesting and successful experiments in testing different methods of sterilization and the effect on the tensile strength.

He finds that catgut can be effectually sterilized by dry heat, without decreasing its tensile strength or making it brittle, by wrapping the separate strands in several layers of paraffin paper. This simple procedure prevents the driving out of the moisture and fat in the catgut, so that it remains unshrivelled and flexible after a prolonged exposure to dry heat. This is the method of Boeckmann. By testing a series of strands of different sizes and qualities he found that a temperature of 140° to 160° C. would effectually sterilize the gut, and would not injure its strength or make it brittle, if employed continuously for one hour. A similar series of tests by the paraform and other methods showed them to be less efficient, and led the author to the following conclusions:

1. Catgut can be sterilized by dry heat with but slight loss of tensile strength.
2. Dry paraform gas is of doubtful value for the sterilization of catgut.
3. Methods of sterilization which involve soaking in antiseptic solutions tend to weaken the catgut to a greater or less degree.

The Surgical Treatment of Nephritis.—FERGUSON (*The Medical Standard*, June, 1899) has applied the surgical principles which would be applied in similar conditions existing in more superficial organs to inflammation of the kidney. It is wonderful that an inflamed kidney ever recovers, and it is probably only on account of its great vascularity, abundant nutrition, and the natural sources of drainage that it has through the uriniferous tubules that it does recover. If by surgical means only sufficient of the kidney can be saved from destruction to carry on even a small portion of the excretory function allotted to it, a great advance will have been made; for we know from the condition of the kidney as found after other diseases, as calculus, that it requires only a small portion of a kidney to sustain life. The surgical principles of treatment we would apply in another organ to prevent the tension, threatened necrosis, molecular destruction, and obstruction to secretion found in the kidney are aspiration, puncture, scarification, free incisions, thorough drainage, etc. Why not apply them to the kidney? Where operations have been performed upon such kidneys through errors of diagnosis the surgeon has been surprised to find the patient relieved of symptoms and, at least symptomatically, cured. Floating kidneys that have been stitched but not opened, or their capsules removed, have been found to continue to give rise to the same symptoms as before the operation, while those that have been incised, to explore them for stone or have had their capsules stripped back, have given no further symptoms.

The author reports two cases in which the patients had most marked cases of Bright's disease, with severe symptoms; they had been subjected to internal medication and rest treatment, but with no relief. He operated upon them, exposed the kidneys, punctured them, peeled the capsules off in part or in whole, and the patients were relieved of all their symptoms. Small sections were taken from the kidneys in both cases and subjected to careful microscopical examination, which demonstrated the correctness of the diagnosis.

The author believes it is too early to come to positive conclusions as to the ultimate results to be obtained by surgical exploration of cases of nephritis. But he feels certain that nephritis has a definite surgical relation. This branch of surgery is in its infancy, yet has the power to relieve suffering. Let us not sacrifice lives and organs on the infamous altar of pseudo-conservatism, nor be too cowardly to recommend and put into practice our honest convictions, founded on knowledge obtained by accidental experience or otherwise, but nevertheless purely scientific.

THERAPEUTICS.

UNDER THE CHARGE OF

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Toulylenediamine.—DR. EDWARD F. WILLOUGHBY presents the results of the administration of this drug, which, as has been asserted, increases both the solid and liquid constituents of the bile. A woman, aged forty-five years, the mother of several children, suffered from intense pain in the epigastrium, often leading to vomiting. Digestion became impaired, there was loss of flesh and strength, and attacks of pain became more frequent. Various methods of treatment gave no result. This remedy was made into one-grain pills, and treatment commenced with one pill each day. After a week no ill effects or appreciable benefit having been observed, the dose was increased to one pill morning and evening. From that time the most indisputable improvement set in; the attacks became fewer and trivial; once only was there vomiting, and only once was morphine needed. Three weeks later they ceased altogether, and the patient was able to eat and drink as any one in perfect health, to walk and go anywhere; the bowels became regular, the stools normal; sallowness and emaciation have disappeared. The effect of the remedy has apparenly been to stimulate the hepatic cells to a free secretion of normal bile and to restore the mucous membrane of the gall-bladder and duct to a healthy condition. It is assumed that the obstruction was caused by inspissated bile and mucus, or "bile-sand," rather than by calculi, and this was removed by the treament.—*The Therapist*, 1899, No. 3, p. 59.

The Treatment of Gallstones.—DR. W. L. CARR believes that treatment during an attack of pain is best begun with a hypodermatic injection of morphine, one-fourth of a grain, and atropine, one one-hundred and fiftieth of a grain, repeated as required. Chloroform inhalation in intense paroxysmal pain is invaluable. Hot applications should be made over the abdomen and to the extremities, to encourage the circulation. Hot baths, when feasible, give relief. Belladonna lessens the spasm of the cystic duct, and is best given in conjunction with the morphine. Large draughts of hot water, with sodium bicarbonate added, will, if retained, give considerable relief, and, if rejected, aid in cleaning out the stomach. Emetics and cathartics are contraindicated during a paroxysm. Treatment between attacks is mainly directed to the diet—fats, sauces, fried articles, and all rich food are forbidden. Sodium bicarbonate, added to a glassful of water and taken before meals, will form a very good substitute for expensive mineral waters. Sodium phosphate is the best laxative. Carlsbad salts and water sufficiently stimulate the gall-bladder and intestines to expel the stones. Six weeks of treatment is sufficient. It is a mistake to continue the use of salines and alkalies. Oil of turpentine is much more likely to stimulate the flow of the fluid bile than to break down old masses of cholesterin. Ether and chloroform, in two-drachm doses, relieve spasm and thus stop the pain. Ether stimulates the circulation, and a feeling of increased comfort results. Examination of dejections may show saponified bile, and less often calculi of cholesterin crystals. Sweet-oil will stimulate peristalsis; the dejections will show "calculi" composed of an oil globule coated with bile. Where there is a temporary complete stoppage of the biliary passages, the administration of bile pills, coated with salol, two hours before meals is of value, preventing putrefactive changes. Massage of the abdomen will empty the gall-bladder of small stones, but may cause the impaction of large calculi, which latter requires surgical treatment, as do constantly recurring attacks.—*The New York Medical Journal*, 1899, vol. lxix. p. 564.

Acokanthera Schimperi.—DRS. THOMAS R. FRASER and JOSEPH TILLIE have separated from the wood of this plant a tasteless, crystalline glucoside, which should be named acokantherin, instead of ouabaïne, the vernacular name for a Somali arrow-poison. This glucoside was found to be more toxic to warm-blooded than to cold-blooded animals, the difference being due to its action upon respiration of the former. Its general effects in rabbits are that after the subcutaneous administration of a small lethal dose death actually results in from sixty to eighty minutes. Motor power is gradually impaired, and is usually so much reduced that before death occurs the animal lies prostrate and powerless, and only a few feeble muscular movements indicate the arrest of the heart or respiration. When the dose is relatively large, or when the poison acts with unusual rapidity, the heart or respiration is arrested before general motor depression has set in, and sharp, convulsive movements occur at death. The respiration is rendered irregular, and is often slow, shallow, and abrupt; severe dyspnœic attacks occur from time to time, and not infrequently early in the experiment, so that death from asphyxia seems impending at a time when the cardiac infarcts are forcible and the animal is able to move about freely. This marked respiratory difficulty was not found to occur in several experiments when tracheotomy had been performed. At an early period the cardiac infarcts are usually felt to be more forcible and slower; just before death the rate is usually slow, but sometimes nearly as rapid as at the beginning of the experiments. Usually, respiratory efforts continue for a brief period after the heart can no longer be felt to pulsate, and, in these cases, on post-mortem examination, the bright red color of the left auricle and the pulmonary veins contrasts strongly with the dark color of the right auricle and of the vena cavæ. Although respiratory movements may occur after arrest of the heart, they are feeble, and the respirations which occur during the few minutes before the heart ceases to beat are often too feeble to sustain life. During most of the experiments the bowels and bladder were evacuated. Toward the close of the experiments the pupils became very slightly contracted, and dilated greatly at death. Large doses injected subcutaneously paralyze the sensory nerve-endings, this being very marked in the neighborhood of the injection. The motor paralysis is not due to paralysis of the muscle, but it is difficult to determine whether at a remote period in the poisoning the terminations of the motor nerves are not weakened or paralyzed, because at the time when stimulation of the motor nerve fails to cause contraction of muscle the muscle itself is found, on direct stimulation, to show signs of paralysis. After the administration of small doses there is, before the arrest of the heart, a period of progressive slowing, the blurring being due to a great lengthening of the diastolic pause. During this period the action of the heart is feeble, its cavities being well filled with blood, and the contractions of auricles and ventricles regular and powerful. After large doses the ventricle becomes arrested in extreme systolic contraction. From transfusion experiments it would appear that diluted solutions do not produce in frogs contraction of the bloodvessels, and even with strong solutions the contraction is slight. So far as blood-pressure is concerned, the rise may be justly attributed to a perfect pumping action of the heart, due to increase in vigor and amplitude of its movements. In time the action of this glucoside is chiefly upon striped muscle fibre, and because of this action, with possibly an action upon the intrinsic cardio-motor ganglia, its chief action is upon the heart. The general conclusion is that it does not differ qualitatively in its action from strophanthin.—*Archives Internacionale de Pharmacadynamie*, 1899, fasc. v. and vi. p. 349.

Salicylic Acid in the Treatment of Pneumonia.—DR. W. C. SEABRING believes this drug to be almost a specific in pneumonia. Of seventy-six patients treated with it but one died. The series cited contain many severe cases, and more than twenty-five were over sixty years of age. The drug is to be given in eight or ten grain doses every two hours. Drugs commonly used are to be given according to the indications, as if the salicylate were not being administered. There is no depressing effect on the heart, and it is the only one of the coal-tar series of which this is true. The writer admits that he has treated but few patients with the salicylate alone, and that they were not severely ill. Recovery followed in every instance, without complications. The following conclusions as to the action of the drug are drawn:

1. Early in the disease a tumultuous pulse is quieted. 2. It is sedative to the general nervous excitement, and also hypnotic in many instances. 3. Pleuritic pain is rapidly relieved. 4. It inhibits delirium. 5. The pulse. remains full and not too rapid. Symptoms of a "tired heart" do not occur, 6. Following the first few doses free diaphoresis occurs and continues. The temperature seldom exceeds 103° F. 7. Complications are very infrequent.

8. Defervescence by lysis is the rule. 9. Recovery is more rapid than when defervescence is by lysis as under the usual treatment. 10. Resolution is slower, but complete recovery is more rapid. 11. The severity of the disease is markedly diminished. The drug destroys the pneumococcus; it is absorbed unchanged directly into the blood, and is brought by the blood into direct contact with the pneumococcus. Defervescence by lysis, instead of by crisis, is explained by the action of the drug causing a slow death of the pneumococci, due to unfavorable surroundings, instead of their sudden death occurring, a crisis resulting.—*Medical Record*, vol. lv. No. 16, p. 558.

Heroin.—Dr. A. W. Bekeroff has made use of this remedy in the treatment of twenty-five patients suffering from tuberculosis, in dose of one-tenth of a grain in powder or pill. In about fifteen minutes after its administration cough ceases and sleep is possible. The respiration, especially when increased by coughing or pleuritic pain, is slower and deepened. In case of disease of the heart, or oxygen-hunger from encroachment upon the respiratory area (large cavities), this remedy is of little or no value. It has but little influence upon the circulation as regards either frequence or fulness, further than that respiration is benefited. It relieves chest-pain, and so favors sleep. Insomnia due to mental excitement is not markedly relieved. It is well borne, even if digestive disturbances exist. It is indicated in the treatment of hæmoptysis because of its beneficial action on cough. Patients do not become readily accustomed to its action, and it may be administered for a month without necessity arising for increase of dose.—*Klinisch-therapeutische Wochenschrift*, 1899, No. 14, S. 118.

The Treatment of Typhoid Fever.—Dr. F. G. Finlay agrees with the advocates of the cold-bath treatment, that nervous symptoms are diminished or alleviated, and that there is a slight decrease in mortality. He quotes in support of this records before and since the introduction of the so-called Brand method. Acute abdominal pain is the first and most marked symptom in perforation; when diminished or absent liver dulness is added to the pain, it is a valuable sign of perforation. Distention of bowels may give this latter symptom. Dr. Finlay believes that the mortality following operative interference is even higher than usually given.

Dr. J. B. McConnell lays emphasis on making the patient as comfortable as possible, and advises small doses of nitro-muriatic acid with a little boric acid and syrup of orange. He thinks the acid may serve as an antiseptic to the upper alimentary tract as well as aid digestion. He advocates the cold bath for combating the fever, eliminating toxins, and reducing hyperleucocytosis, but not until the temperature rises to 104° F. In place of actual immersion he prefers the cold pack, as it causes much less shock and reduces the temperature equally well. When the temperature is lower (102° to 103° F.) cool sponging is sufficient. In intestinal hemorrhage and collapse, restriction of the diet should be continued for several days; camphor and opium are also indicated. A warning is given against lead, which does not stop the hemorrhage from the bottom of an intestinal slough. Ergot the speaker considers harmful. The hemorrhage is usually from lateral eroded vessels, and ergot, being a general vasoconstrictor and increasing vascular tension, adds to the loss of blood through increasing the erosion. He suggests nitroglycerin or any of the nitrites for diminishing the tension. The bacilli are so widely distributed that intestinal antisepsis cannot be of much avail. It is doubtful whether any drug can inhibit the bacilli in the alimentary tract.

DR. JAMES BELL advises early operation in perforation—within twenty-four hours at the latest and as much sooner as possible. The one contra-indication to operation is collapse; a few hours later the patient may have rallied, and then operation is to be performed at once. He believes the only reliable early symptom is pain, the other classical symptoms occurring too late to be serviceable. If there is any question as to the presence of perforation, it is better to risk operation than to delay.

DR. ADAMI believes in mild purgation, to prevent secondary infection from intestinal absorption. He quotes and recommends Owen Paget's method of giving large doses of salad oil—by the cupful, *per os* and *per anum*. It is not irritant, and is taken without objection; the bowels are moved mildly, and it also acts as a food stuff. When the stools have lost their offensiveness it is no longer indicated. At the same time cold baths are to be given, and, possibly, intestinal antiseptics.

DR. W. E. WEEKS objects to cold baths for patients in whom subsequent reaction is not satisfactory. When shivering is kept up for fifteen or twenty minutes he thinks no benefit has been derived from the bath. The cold pack is recommended in severe headache. Phenacetin is temporarily useful. In place of salad oil three or four grains of calomel are recommended, especially when the abdomen is distended and the stomach is full. The sponge bath, with ammonia or alcohol, is usually sufficient to reduce the temperature, and is a satisfactory substitute for the cold bath.

DR. D. J. EVANS recommends the addition of gruels, malted milk, and even beef juice to the milk diet of typhoid patients. He also advocates the cold pack.

DR. F. R. ENGLAND recommends, in place of purgation, enemata of glycerin and warm water, which may be repeated frequently.

DR. WESLEY MILLS thinks cold water in typhoid fever acts by so affecting the nervous centres that nutrition is in turn benefited, and considers the disease a constitutional rather than local affection. He proposes a more varied liquid dietary, provided no bad reaction follows.

DR. H. A. LAFLEUR mentions coffee, tea, thin gruel, egg-nog, clear soups, koumyss, soft-boiled eggs as among the articles of food permitted patients, even at the height of the disease. The urine of patients subjected to cold baths is greatly increased in toxicity, the kidneys being stimulated by the nervous system. Toxæmia is less common in these patients. Lack of delirium is another feature. These are among the advantages of cold bathing. Intestinal antiseptics may be added to the bath treatment.—*The Montreal Medical Journal*, 1899, vol. xxviii., No. 2, p. 96.

[The statement that the urinary toxicity is increased after cold bathing has the advantage in common with other gratuitous hypotheses—that it can be neither proved nor disproved. At present there is no reliable method of measuring the urinary toxicity. Cold baths are, however, certainly diuretic. As for intestinal antiseptics, if these are intelligently used there seems to be no indication for cold bathing.—R. W. W.]

Cured Pulmonary Tuberculosis.—Dr. M. Heitler reported seven instances in 1892. The present patient became ill in that year. In fourteen months he was cured, and has remained so until the present. The disease was bilateral, had progressed to marked consolidation, and was confirmed by the presence of large numbers of tubercle bacilli in the expectoration. Physical signs were entirely absent three years from the beginning of the attacks. The treatment consisted in careful alimentation and residence in a pure air, with persistent use of creosote at the commencement.—*Centralblatt f. die gesammte Therapie*, 1899, Heft. iii. S. 129.

The Treatment of Croupous Pneumonia with Hot Water-bags.—Dr. Kolipinski has had much success with this method, and believes that it is often possible to abort an attack. Early recognition of the disease is important. Each bag should hold one gallon; they are to be placed side by side on the bed with the mouths pointing upward. The bags form a cradle for the posterior scapular regions. Sufficient covering to prevent burning the patient is wrapped around the bags. The external temperature should be about 110° F.; over 120° F. is liable to cause severe burns. The bags should be refilled every three or four hours. This treatment is to be continued without intermission until apyrexia has existed for several days. Liquid diet, preferably milk and cocoa, is recommended. If by the use of heat locally applied hepatization can be prevented, or if already present, consolidation can be cleared up, then internal medication is not indicated, and may even prove harmful.

The writer objects to drugs in general in connection with this method of treatment, and especially interdicts the use of morphine or opium for any purpose. He considers the insomnia not to require treatment, and the cough a valuable indication that the patient will recover. In children and infants treatment with hot water-bags is impossible, and flaxseed-meal poultices are to be substituted. In a series of ten patients there was but one death, and in this instance the treatment was not begun until the disease was fully developed and extending. Seven of the patients were sixty years of age or more. —*Maryland Medical Journal*, 1899, No. 12, vol. xli. p. 179.

Treatment of Pertussis.—Dr. J. Madison Taylor remarks that a variety of measures directed to local cleansing of the upper respiratory passages are powerful in limiting both the progress and severity of the process. Vaccination in those not already protected has been marked by several authors as curative. The remedy which may be safely applied by the mother or nurse is amyl nitrite, 1; spirits of chloroform, 6; ether, 10—of which a few drops may be placed upon a handkerchief, and this held to the child's nose during the paroxysm.—*Pediatrics*, 1899, No. 7, p. 308.

Treatment of Eczema by Picric Acid—Dott. Francesco Radaeli reports upon the use of this substance in 10 per cent. aqueous solution upon twenty-five patients. There was not noted any yellow coloration of the conjunctiva nor changes in pulse-rate or temperature. The urine, however, was diminished in amount and of a yellowish-red color, although no picric acid could be detected in it. Intestinal disturbances and cutaneous eruptions are classed as symptoms of poisoning, but are frequently susceptible of other obvious interpretation. At all events they were slight and disappeared in a short time. In fourteen of these patients suffering from acute eczema, the results were satisfactory in a short time. Of the other eleven, four showed a marked benefit after application of picric acid used alone, or later alternating with other remedies. Evidently here picric acid had shortened the duration of the disease. In seven instances there was no benefit. Some of these were benefited by moist applications of salicylic acid, while others resisted all methods. In a few instances applications of picric acid seem to aggravate the local conditions, increasing the congestion, œdema, and the number of vesicles. This aggravation, however, rapidly disappeared under appropriate treatment. The following conclusions are offered: 1. This method should be tried in acute eczema and in the exacerbations of chronic eczema. 2. When well borne, and it generally is, after a brief period of smarting the symptoms are relieved. 3. This betterment generally goes on to cure; rarely the benefit is temporary. 4. If not well borne it does not cause severe local disturbance. 5. It appears to act as an antiseptic and keratoplastic agent.—*La Settimana Medica*, 1899, No. 9, p. 97.

Apomorphine.—Dr. E. L. Abogado recommends this, when given hypodermatically, as an excellent emetic. For accumulations of mucus in the respiratory passages or in the chronic catarrhs it facilitates expectoration. It is useful to relieve the dry cough of tuberculosis. Dominguez recommends its use in cerebral congestion when it is desirable to empty the stomach quickly, and for patients suffering from digestive disturbances to tone up the organs.—*Cronica Medica Mexicana*, 1899, No. 9, p. 248.

The Treatment of Diabetic Coma.—Dr. Ludwig Herzog believes that before the actual onset of coma, but in the presence of severe symptoms, sodium bicarbonate, in from one hundred and fifty to six hundred grains daily, is indicated. If urgent treatment is required in developed coma the subcutaneous infusion of physiological saline, or 3 to 5 per cent. of sodium bicarbonate, even a stronger combined solution, should be frequently repeated. The unpleasant symptoms observed from the use of sodium bicarbonate are diarrhœa, palpitation, and even bloody urine.—*Berliner klinische Wochenschrift*, 1899, No. 14, S. 295.

Notes on Cocaine.—Dr. W. P. Jenney writes that an aqueous solution of cocaine hydrochlorate applied to the skin is in part absorbed, coolness follows, and if a considerable surface has been thus treated physiologically, symptoms appear like those following chewing of cocoa-plant leaves. The quantity of cocaine so applied may be many times the maximum safe internal or hypodermatic dose, still no toxic action results. Local anæsthesia is somewhat modified. Sensation continues in the area treated for twenty minutes or more. Bruises thus painted over soon begin to fade, and discoloration and congestion rapidly disappear through the constriction of the bloodvessels. Pain more slowly subsides, seldom returning after the anæsthetic effect of the drug has ceased. Deep-seated pain requires a larger interval before relief is afforded. In such instances the skin is to be kept wet with the solution of cocaine until ten grains or more have been applied. Probably the effect is less due to action through the circulation rather than to local absorption. The strength of the solution used should be 2 to 4 per cent.; a fresh preparation is requisite. All absorption ceases if the surface dries. Bruises, sprains, and local inflammations can be thus much relieved. When neuralgic pain is superficial the application of cocaine solution is followed by immediate relief. A 6 per cent. solution is recommended for deep-seated pain in pleurisy, pneumonia, and peritonitis, a gradual palliation following. Marks due to the hypodermatic needle, when painted, rapidly disappear. Absorption of the toxic alkaloids will occur if the skin is broken, and in highly inflamed conditions. There are probably two alkaloids present in the drug as sold. One, rapidly absorbed by the skin, is non-poisonous and reduces local pain and inflammation; the other is not absorbed and remains on the skin surface. This latter is white, solid, intensely bitter, and causes numbness of mucous membranes. The variable action of different samples of the drug may be thus explained, depending on the proportions of toxic and non-toxic alkaloids present. The writer suggests lethane as a name for the toxic alkaloid.—*Medical Record*, 1899, vol. lv. p. 424.

Quinine Dermatopathy.—DR. CHOMATIANOS reports that an army officer every time that he takes quinine, within six hours erythematous areas, varying in size from a ten-cent piece to that of a dollar, appear on the hands, face, and penis. Later these areas become the seat of bulla, filled with limpid serum. The penis swells as if paraphymosis existed, and muco-pus is discharged as in balanoposthitis. After two or three days the bulla rupture and with the discoloration slowly disappear. These manifestations appear with the first dose of quinine, but once having been established the remedy does not give rise to any symptoms.—*La Grèce Médicale*, 1899, No. 4, p. 29.

Cure of Morphine, Chloral, and Cocaine Habits by Sodium Bromide.—DR. N. MACLEOD advises the following: The weight of the patient is to be ascertained, and, no organic disease contraindicating, sodium bromide is to be given in two doses of two drachms in solution every two hours for two days and one drachm during the third day. None is to be administered after bedtime on the third day. Three ounces in all will usually suffice, but more may be given to induce deep sleep, which should last five or six days and nights. During this period nothing but milk is given. Twice a day the bladder and rectum should be evacuated, oftener if necessary. For a week or more following return to consciousness, speech and locomotion, which are very much impaired or impossible on first awakening, gradually improve; the mental condition returns to normal more slowly. Delusions become less frequent and the memory improves. Sleep is often irregular but further treatment is undesirable. Solid food is indicated as soon as asked for. Exercise is desirable as soon as the power of locomotion is recovered sufficiently. Muscular tenderness soon passes off. Morphine may be given in the habitual dose on the first day, halved the second, and very little or none on the third day. Chloral, if there is a good sleep the first night, may be cut off at once. Cocaine may be reduced like morphine. Six weeks should be insisted on for convalescence. Cases cited show: 1. The withdrawal within three days of the drug causing the habit. 2. Absence of suffering. 3. Impossibility of deception on the part of the patient. 4. No substitution habit results, and the patient loses his craving, whether he wishes to or not. Too few patients have been thus treated to be certain that there is no risk. Nothing, in a series thus treated, points to vascular, respiratory, or alimentary disturbance of a serious nature.—*British Medical Journal*, 1899, No. 1998, p. 896.

Orthoform.—DR. F. MIADOWSKI reports an unpleasant result following the use of this substance. A varicose ulcer of the leg was treated with a 5 per cent. ointment. After a few days a gangrenous area nearly the size of the palm of the hand was found, which was bluish-black in color, and the skin about was reddened, and burning pains were felt in it. After removal of the ointment and cleansing with lysol the healing progressed rapidly.—*Münchener medicinische Wochenschrift*, 1899, No. 12, S. 282.

Treatment of Rheumatism in Children.—DR. PHILIP F. BARBOUR believes that salicylic acid and the salicylates are not only eliminating agents but also anodynes, and in both of these respects are preferable to opium. Salicylic acid is disagreeable to the taste, and should not be used when even partial deafness exists. Salol, from its contained phenol, may act unfavorably upon the blood and kidneys, and children are liable to an idiosyncrasy toward phenol. Of the salicylates the ammonium salt is preferred, because it is much less disagreeable to take than the sodium salt, and the ammonium tends to counteract the depressing effects of the salicylic acid. It is not nearly so nauseating and may be rapidly pushed. It should be largely diluted with water, in order to more rapidly eliminate the morbific material. In case the salicylates cannot be taken, pain is best relieved by antipyrin, phenacetin, or lactophenin in small doses.—*Pediatrics*, 1898, No. 7, p. 289.

The Treatment of Coryza.—DR. MAX NASSAUER regards this malady as due to an infection, and proceeds to cleanse and disinfect the nasal mucous membrane, which is done with a weak (faint rose-colored) solution of potassium permanganate in warm water. This is used in a nasal cup or by other method of irrigation, so that all of the nasal mucosa is reached. The nose is then dried and cleansed with cotton. Finally, the anterior nares are tightly closed with cotton, and the head being thrown back, the posterior nares and regions behind the palate again cleansed. The procedure is finished by allowing cotton moistened in the solution to remain in the nose for an hour.—*Klinisch-therapeutische Wochenschrift*, 1899, No. 1, S. 7.

On Belladonna in the Treatment of Broncho-pneumonia in Children.—DR. J. A. COUTTS writes of his successs in treating a series of cases of this disease with large doses of belladonna, no other medication being required. The free secretion into the bronchial tubes and pulmonary tissues is very markedly diminished. Of several dozen patients so treated only two died. After a few doses of the drug the severe dyspnœa is relieved, and a marked change for the better ensues. The duration of the disease is also lessened—instead of several weeks, only two or three days elapse before convalescence begins. The writer lays stress on two points: 1. The amount given should be large. 2. The tincture of belladonna is not to be used, for it is unreliable, but preferably the extract. The dose is a quarter of a grain every three or four hours. This dosage applies equally to infants and older children. Disadvantages have been a slight delirium in several instances, easily remedied by lessening the dose. Flushing of the skin and a scarlet rash are not infrequent. Less often noticeable, mydriasis is present.—*The British Medical Journal*, 1899, No. 1987, p. 207.

GYNECOLOGY.

UNDER THE CHARGE OF

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Trophic Disturbances of the Bladder Following Gynecological Operations.—MIRABEAU (*Centralblatt für Gynäkologie*, 1899, No. 11) calls attention to the fact that the vesical irritation so often observed after operation is usually referred to infection or mechanical injury, while in a few instances it has been due to ligatures which have made their way into the bladder. He reports two cases of cœliotomy, with persistent vesical symptoms, in which cystoscopic examination showed general anæmia and atrophy of the mucous membrane, evidently due to circulatory disturbances, the arteries being abnormally small while the veins were prominent. He inferred that the collateral circulation had not been established as usual after ligation of the vesical arteries. In these cases treatment of the bladder itself may do more harm than good. Massage, the separation of adhesions, and softening of exudates in the neighborhood of the organ are indicated. As a prophylactic measure the surgeon should avoid mass-ligatures and ligate the vessels separately as far as possible, sparing those which supply the bladder.

Changes in the Ovaries Attending Starvation and Forced Feeding.—PETROFF (abstract of thesis in *La Gynécologie*, February 15, 1899), as the result of experiments on dogs and rabbits, noted the following interesting facts: When the animals were starved the ovaries presented a normal appearance so long as the body lost only one-tenth of its weight, but when the diminution reached from 20 to 40 per cent. marked changes were observed in both the cortex and the stroma. Foci of fatty degeneration appeared in the cortical layer of epithelium, which advanced even to the stage of necrosis; the same processes were observed in the stroma, though less advanced.

On forced feeding of the same animals after starving them the lesions in the ovaries were more marked for a time, and even increased, but the organs returned to their normal condition after the original body-weight had been regained. There was never any change in the follicles or ova. Karyokinesis of the cells of the membrana granulosa and internal epithelial layers of the follicle were common both during starvation and during the subsequent process of forced feeding.

Late Recurrence after Amputation of the Cancerous Cervix.—PAMARD (*Congrès de Chirurgie; La Gynécologie*, February 15, 1899) reports the case of a young woman with epithelioma confined to the posterior lip of the cervix uteri. High amputation was performed with the galvano-caustic wire, the disease being thoroughly removed. The diagnosis was confirmed by the microscope. Fifteen years later (!), the patient having remained perfectly well in the meantime, she developed malignant disease on the posterior vaginal wall, which was excised and the wound thoroughly cauterized. The writer adds that, in spite of the excellent immediate results of vaginal hysterectomy, when the disease is limited to the cervix high amputation with the cautery would seem to be preferable.

Ligation of Arteries in the Case of Inoperable Tumors.—TUFFIER (*La Gynécologie*, February 15, 1899) reports seven cases of inoperable carcinoma of the uterus, in one of which the patient lived for over two years after the operation, dying from metastasis. In the others the disease was not arrested, although the hemorrhages and foul discharges were greatly diminished. The operation, in his opinion, is simply palliative.

In three cases of fibromyoma in which the uterine arteries alone were ligated the hemorrhages were arrested, but there was no decrease in the size of the tumor.

Roux tied both internal iliacs several times for the relief of inoperable cancer of the uterus, but the subsequent amelioration of symptoms continued for only a few weeks.

Intra-uterine Injections of Iodide of Alumnol.—LEBEDEFF (*Wratch*, 1898, No. 49) describes the changes in the endometrium following the injection of this drug, as recommended by Grammatikati. Fragments of tissue were removed with the curette for examination both before and after treatment. It was demonstrated that the diseased mucosa was entirely destroyed and the necrosed tissue cast off. After the injections were suspended the healthy mucosa began to be removed until the cure was complete. Gonococci within the uterine cavity were destroyed. In cases in which menstruation had been arrested for several months the periods returned regularly.

The advantage of this method of cauterization over curettement lies in the fact that even after thorough use of the curette islands of diseased mucosa are often left, which serve as the starting-point for fresh disease, since they may contain gonococci and other pathogenic organisms; or the latter may be so deeply situated that they are not removed. Alumnol, on the contrary, acts upon the deeper tissues. Diseased ovaries are often favorably affected by the restoration of healthy endometrium.

Sarcoma of the Uterus.—FRANQUÉ (*Zeitschrift für Geb. u. Gynäkologie*, Band xl. Heft 2) reports sixteen cases which were most carefully studied.

Judging from these and all the other cases reported in literature during the past ten years, he infers that sarcoma of the uterus presents far more variations than does carcinoma, both clinically and anatomically. Giant-cells were found in one-third of his cases. Sarcoma of the endometrium was always of the round-celled variety, while in the uterine muscle it was either spindle-celled or the mixed form. Among his specimens was one of polypoid sarcoma of the cervix, and one of *myosarcoma striocellulare* of the corpus uteri.

He notes the frequent occurrence of hyalin and myomatous degeneration and the greater frequency of sarcoma of the uterine wall as compared with disease of the endometrium. There were three cases of mixed sarcoma and carcinoma.

Remote Results of Vaginal Hysterectomy for Uterine Fibroids.—BUSHBECK (*Archiv für Gynäkologie*, Band lvi. Heft 1) reports the following results in one hundred cases: The mortality was 3 per cent., ligatures being used exclusively. Sixty-five patients who were examined from one to ten years after operation were entirely cured and able to perform their usual duties, being physically and mentally sound.

The writer believes that it is of the greatest importance to make a careful examination of the entire circulatory system in every case of fibromyoma before operating. By the systematic use of subcutaneous injections of saline solution patients who have been greatly reduced from loss of blood can in a short time be enabled to stand even severe operations.

Ultimate Results of Myomectomy.—ABEL (*Archiv für Gynäkologie*, Band lvii. Heft 2) presents a complete record of the abdominal sections for uterine fibromyomata performed by Zweifel from 1887 to 1894. Seventy-one patients were repeatedly examined by the writer during a period of five years, so that he was able to state their exact condition.

Many interesting facts were brought out, among them the behavior of the stump after supravaginal amputation (according to Zweifel's method). Contrary to the opinion of those who advocate total extirpation, in only nine cases did suppuration occur, the patients making a good recovery and presenting no local complications in subsequent examinations. Vesical symptoms were less marked than after hysterectomy. The patients were all able to perform their usual work within three months after operation. The question of vaginitis and contraction of the vagina after supravaginal amputation was carefully studied; the former appeared to be due to mechanical causes (difficult coitus) rather than to an irritating discharge from the cervical canal.

The danger of malignant degeneration of the cervix seems to be so small as to furnish no argument against the operation. According to the writer's observation it undegroes progressive atrophy.

A careful study of the cases in which the ovaries were left after removal of the uterus led to the inference that the glands undergo a more or less rapid atrophy, which results in complete loss of their functions before the natural time of the climacteric. Glaenecke's statement that atrophy of the external genitals is delayed when the ovaries are preserved was not borne out by the more extended observations of the writer. On the other hand, the phenomena observed resembled the normal rather than the artificial climacteric noted after castration of young women. The average persistence of the menstrual molimen when the uterus alone was removed was eighteen months.

Three patients whose ovaries were not removed presented the interesting phenomenon of more or less regular menstruation after supravaginal amputation, persisting in one instance for five years. The writer concludes that it is better to preserve the ovaries whenever this is possible.

Dermoid and Teratoid Tumors of the Ovary.—KROEMER (*Ibid.*), after a study of twelve specimens, is led to agree with Pfaunenstiel's statement that these tumors are ovulogenous, since they always present evidences of the three embryonic layers. The ultimate cause of their development is still unknown, but it may be assumed that their manner of development is not one of pathogenesis, since the latter is a physiological process. The cleavage of the ovum from which a dermoid develops is pathological. Only the earliest portions of the embryo develop, hence the prominence of the ectoderm and cephalic end, while the remaining portions either do not develop at all or are deformed. The differentiation is one-sided, and is sometimes confined to a single organ, such as a breast. In connection with this subject the question of the differentiation of sex in the ovum presents a suggestive field for future study, though the expectation of affecting this result, as claimed by Schenck, may be dismissed as vain.

Chloride of Zinc in Chronic Metritis.—DELBET (*Annales de Gyn. et d'Obstétrique*, 1899, No. 1) reports sixty-two cases treated by injections of chloride of zinc varying in strength from 30 to 40 per cent., the number in each case varying from 3 to 8, given at intervals of from two to fourteen days. Although the writer is skeptical regarding the danger of forcing the fluid into the peritoneal cavity (as was claimed in a fatal case of Hofmeier's), he nevertheless advises that due care be exercised to avoid this accident.

The injections are often painful, especially at first, and transient syncope has been observed, but no permanent ill effects were noted. The best results were obtained in hemorrhagic endometritis. Of twenty-six patients belonging to this class twenty-two were cured. In one the hemorrhage was so persistent, in spite of curettement, that the uterus was extirpated, but no lesion was found sufficient to explain the symptoms. In glandular endometritis eight cures were obtained in fifteen cases. In six in which the adnexa were diseased only three were cured.

Capillary Drainage in Puerperal Endometritis—GOUZARTCHIK (*Ibid.*) describes the following method of treatment pursued successfully in 114 cases: The cervical canal is swabbed with bichloride solution, 1 : 200, after which the uterine cavity is disinfected with the same solution, applied on cotton, and is thoroughly dried. A tampon saturated with 1 : 1000 bichloride is then introduced into the cavity, and is allowed to remain for a few minutes, when the excess is removed with a dry swab. The uterine cavity is then tightly packed with iodoform-gauze wrung out in a 2 per cent. solution of carbolic acid, after which the vagina is tamponed. The intra-uterine tamponade is repeated at the end of from twelve to twenty-four hours, and this procedure is repeated until a cure is obtained, five treatments being the average number. Out of 115 patients thus treated only one succumbed to septicæmia. The temperature usually fell after the first tamponade, and often reached normal within a day or two. Parametritis developed in a single instance. The average stay of the patients in the hospital was only two weeks after the delivery. The best results are obtained in cases in which the adnexa are not affected.

OBSTETRICS.

UNDER THE CHARGE OF

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Intra-mortem Cæsarean Section.—In the *Prager med. Wochenschrift*, 1899, No. 17, SCHICK reports a case of a patient in pregnant condition who was supposed to have a tumor of the brain. She had borne children, and suffered greatly from pain in the head and other cerebral symptoms. She died undelivered, in collapse, with cyanosis.

It was deemed advisable to deliver the fœtus by Cæsarean section, as labor had progressed so little that the uterus could not be rapidly dilated. The mother was so far advanced in coma that she required scarcely any anæsthesia. The child was delivered alive without difficulty, the usual operation being performed, and the uterus carefully sutured and left. The mother perished very soon after operation, and tubercular meningitis at the base of the brain was found to have caused her death. The child survived its delivery.

The Treatment of Asphyxia in the New-born.—KNAPP (*Prager med. Wochenschrift*, 1899, No. 17) concludes that in the mild forms of asphyxia it is well to delay tying the cord until mucus has been removed from the trachea, or until rhythmical contractions have been made upon the tongue. If the child does not breathe the cord should be at once tied and the skin irritated in some gentle manner.

In the severe form of asphyxia the cord should be at once severed and artificial respiration promptly performed. The child should be frequently put into a warm bath and rhythmical contractions made upon the tongue.

When, in addition to asphyxia, the child is profoundly anæmic, injections of normal salt solution should be made.

Measles Occurring During Pregnancy.—In the *Prager med. Wochenschrift*, 1899, No. 17, SALUS reports a case of typical measles occurring in a pregnant woman, during which labor came on spontaneously, a living child being born. Hemorrhage from the cord occurred soon after birth, which ceased when the vessels were separately tied. The mother had a very slight rise of temperature, but otherwise made an uninterrupted recovery. The child had no symptoms of the disease.

On examining the placenta it was of normal size and showed no essential change in its structure. On the maternal aspect were collections of extravasated and clotted blood. The same appearance prevailed upon the membranes, the clots having somewhat the appearance of very small placental lobes. One of them was as large as a hen's egg. On microscopical examination these were found to be caused by bleeding into the spongy layer of the decidua.

The Treatment of Abortion.—In the *Monatschrift für Geburtshülfe und Gynækologie*, 1899, Band ix., Heft 5, LANTOS contributes an interesting paper under this title. He limits his cases to those in the first three months of pregnancy, and naturally divides them into threatened and complete abortion. His cases numbered 300, and in them he recognized as the principal complications bleeding and septic infection.

His treatment consisted in thoroughly emptying the cavity of the uterus unless he had positive evidence that all of the ovum had been discharged. Thus in 246 cases the uterus was emptied with the finger; in 4 with placental forceps, and in 50 with the curette. On examining these patients in 184 the finger could be introduced into the uterus; in 24 only the finger tip, and in 10 two fingers, while in 32 it was impossible to introduce the finger. Nineteen of these cases were complete spontaneous abortion. Two hundred and eighty-one were incomplete.

In the 19 cases of complete abortion 17 made good recoveries without interference. The pregnancy in these cases did not exceed the second month. In 15 the uterus was easily emptied with the finger, while in 4 chill and fever called for the complete cleansing of the uterus, and in 3 of these patients the temperature immediately and permanently fell. One of these cases ended fatally from septic infection; this was the only fatal case in the 300.

Of the 281 incomplete abortions, in 221 the entire placenta or part of it was retained. In 60 portions of decidua were left behind. The finger was successful in removing the placenta 216 times. In 4 patients the placental forceps was employed and in 1 the curette. Retained decidua was removed 49 times with the curette and 11 times with the finger.

The chief indication for active interference in incomplete abortion was bleeding, and of 196 cases of this complication 195 were promptly controlled by emptying the uterus with the finger. In one of these patients it was considered necessary to inject a preparation of iron to stop the bleeding. In two of these fever occurred. One of these patients had an exudate in the pelvis at the time of abortion. The other had scarlatina, followed by a pelvic exudate, but both recovered. In the cases in which the abortion was completed because of the fever the cervix was usually found partly open. Most of these cases did well as soon as the uterus was thoroughly emptied and disinfected.

The cases of curetting, fifty in number, had bleeding as an indication in forty-four, and fever in six. In all of these the curetting was promptly effective. For washing out the uterus lysol was used in patients who had no fever, and in those who had, a weak solution of bichloride of mercury was employed.

None of these cases were anæsthetized. The writer succeeded by manipulation in pressing down the uterus so that the finger could be introduced. The after-treatment consisted in liquid diet, cold applications to the abdomen, moving the bowels freely, and cleansing the external parts with an antiseptic, and limiting vaginal douches to those patients who had fever.

The writer sums up his experience in a series of formal conclusions, of which the following are the most important: When the os is but little if at all dilated, bleeding is not an important complication, and may be treated by rest in bed and by vaginal douches. When considerable bleeding occurs it is impossible to stop the abortion, and treatment should be selected accordingly. Bleeding which persists after an abortion points to the retention of some portion of the ovum in the uterine cavity. As regards the importance of vaginal tampons in these cases, they do not prevent abortion, but their use favors it. When the uterus is empty, as a rule, the cervix closes. When, however, the cervical canal is partially open and bleeding is present, it is good evidence that the womb has not been emptied. In cases of complete abortion, when neither the ovum nor the appendages are retained, interference should not be practised except for some serious complication. In incomplete abortion, however, interference is imperative. The use of the intra-uterine tampon of gauze is most successful in cases of hemorhage where the cervix dilates but little. As a rule, however, the more rarely an instrument or finger is introduced within the uterine cavity the better for the patient.

The finger is preferable in recent cases of abortion wherever it can be introduced. When, however, the case has persisted for some time, and the cervix is closed, gauze should be employed as a tampon until dilatation occurs, when the placenta is expelled, after which the uterus should be curetted. It is seldom necessary to dilate the uterus for curetting in cases of abortion. It is always better to curette or to empty the uterus with the finger rather than to employ intra-uterine douches. After the womb has been so emptied bleeding should not be present, and its persistence points to the retention of some portion of the ovum. As a general rule, active treatment of abortion is prophylactic, because it prevents hemorrhage and infection. If the expectant treatment be followed the patient is exposed to bleeding, anæmia, fever, and retention of decidual and placental tissues and chronic endometritis. The danger of active treatment arises only when the operator is not aseptic in his methods. In all cases of septic infection complicating abortion, where either the whole or part of the ovum is retained, the uterus should be emptied as soon as possible and cleansed with bichloride solution. Where septic infection persists after abortion the total removal of the uterus, tubes, and ovaries is indicated.

The Frequency of Contracted Pelvis Among American Women.—In *Obstetrics*, 1899, vol. v., No. 5, WILLIAMS reports the examination of 1000 patients, of whom 469 were negroes. Among the entire number pelvic contraction was found in 13.1 per cent., which corresponds very closely with the general average observed in Germany. Pelvic contraction is 2.77 times more frequent in negro than in white women. Among white women in America, contracted pelvis occurs in 7 per cent., which is as frequent as in many German cities, in Paris, and more frequent than in Vienna. The necessity for pelvimetry becomes evident if these results are taken into consideration.

Inversion of the Uterus Occurring After Labor.—In the *Wiener klin. Wochenschrift*, 1899, No. 16, Braun describes the case of a primipara, aged twenty-four years, of feeble development, who was delivered spontaneously of a large child, and in whom retention of the placenta made curetting necessary. She recovered from this labor, and in her second pregnancy the presence of twins was diagnosticated. They were delivered spontaneously, as were the placenta. No pressure was made upon the uterus nor traction upon the umbilical cord. The womb, however, became suddenly inverted, and profuse hemorrhage occurred. The uterus was at once replaced and packed with iodoform gauze, the patient making a good recovery. In the absence of manipulation this case seems to illustrate the influence of a feeble and relaxed condition in determining inversion of the uterus.

The Technique of Cæsarean Section.—In the *Wiener klin. Wochenschrift*, 1899, No. 16, Rossa reports two cases of rhachitic pelvis in which delivery was accomplished by Cæsarean section, employing the transverse incision across the fundus, as recommended by Fritsch. In both the patients made good recoveries, the operations being entirely successful.

Adhesion of the Membranes as a Cause of Delayed Labor.—In the *Centralblatt für Gynäkologie*, 1899, No. 19, Löhlein draws attention to the fact that in some cases where delay in labor is thought to be due to deficient contraction of the uterus it is really caused by adherence of the membranes to the lower portion of the uterus. He could detect but fifteen of these cases in 3000 births, or 0.5 of 1 per cent.

The diagnosis was made by introducing the finger and sweeping it about the internal os, when it should move freely about the uterus and the membranes. If adhesions of the membranes can be readily separated labor will promptly go on. If, however, this fails the membranes should be ruptured, when the delay will cease. He describes two typical cases which illustrate his statements.

Cæsarean Section with Fritsch's Transverse Incision.—In the *Centralblatt für Gynäkologie*, 1899, No. 19, a number of cases of this operation are reported by four different operators.

Thumin, in Landau's clinic in Berlin, reports a successful case of Cæsarean section delivered by Fritsch's transverse incision. The stitches passed through the decidua in this case, but no complications resulted.

Braitenberg, in the clinic at Innsbruck, reports a case operated upon by Ehrendorfer. In this patient the incision came directly across the fundus upon the placenta, which was attached at this point. No dangerous loss of blood followed, however, and the operation was brought to a conclusion without difficulty. Ergotine was injected during the operation. Mother and child made a good recovery.

Seidentopf, of Magdeburg, reports three operations, two performed by himself and one by Dahlmann. In the first case the operation proceeded smoothly. A few days afterward the temperature rose and the lochia was found to have ceased. This returned after an intra-uterine douche In case second labor had progressed so far that the contraction ring was plainly present. No difficulty, however, was found in delivering the chid. The uterus did not contract; profuse hemorrhage occurred, but ceased upon packing the womb with gauze and bringing the end of the gauze out through the vagina. The patient finally made a good recovery. In case third cancer of the cervix was present and the case was inoperable. The child was delivered by the transverse incision into the uterus and survived the operation. The mother's convalescence was retarded by suppuration in the abdominal wound, which was thought to have been caused by her frequent coughing. From this, however, she recovered, although nothing could be done for the cancer.

Perlis reports from the hospital in Kiew, Russia, the case of a pregnant patient who had cancer of the uterus. She was too far advanced for a radical operation, and accordingly she was placed in Trendelenburg's position, the abdomen opened, and the uterus opened by transverse incision of the fundus. She was delivered of a living child and recovered completely from the operation.

OTOLOGY.

UNDER THE CHARGE OF

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Gunshot-wounds of the Ear.—T. Rosati (*Ann. des mal. de l'Oreille*, p. 166, August, 1898) concludes, after numerous experiments, that, on account of the extraordinary resistance of the temporal bone, pistol balls penetrate with great difficulty as far as the cranial cavity. In most instances surgical intervention for the discovery of the ball is full of difficulties, not only on account of the uncertainty of the point of arrest of the projectile, but also because of its altered shape and the serious condition of the wounded. If no obstacles exist the ball should be removed at once. Radiography has not furnished any aid to the writer in searching for projectiles lodged in the cranial bones. The organ of hearing is always more or less seriously injured by such wounds. Usually total and permanent deafness is the result.

Artificial Closure of Cicatrized Perforations of the Membrana Tympani.—A. de Simoni (*Ann. des mal. de l'Oreille*, August, 1898, p. 160) has employed with success trichloroacetic acid applied to the cicatrized edges of perforations in the membrana tympani, in order to bring about their closure. He subjected twenty-one patients to this treatment in Gradenigo's public clinic in Turin, but was only able to follow out the treatment in fourteen. Of them eleven were healed and three were still under treatment. Great care must be exercised not to allow the acid to reach any part but the edges of the perforation, as entrance of the acid into the drum-cavity is extremely painful.

Treatment of Acute Otitis Media.—S. C. Larsen (*Archiv f. Ohrenhr.*, November 30, 1898) has made some very interesting and valuable investigations concerning the treatment of acute otitis media occurring in sixty-five previously healthy soldiers in the Garrison Hospital in Copenhagen. His object was to find out the treatment of middle-ear suppuration, after perforation of the membrana has occurred, which will prevent complications and bring about healing of the ear most quickly. Inflations of air into the tympana as well as insufflations of antiseptic powder in the ear were excluded in all cases. The patients were divided into four classes, viz.:

1. Those not placed in bed and treated without antiseptic instillations (½ to 1000 bichloride). 2. Those not placed in bed and treated with the antiseptic instillations. 3. Those placed in bed and not treated with instillations. 4. Those placed in bed and treated with instillations. In all cases the ears were mopped out and then stopped with sterilized absorbent cotton.

The duration of the disease does not seem to be much if at all influenced by remaining in bed; but remaining in one's room until suppuration ceases seems to shorten the disease.

The duration of the acute suppuration was six days less in those patients treated without instillations than in those treated with instillations, external relations being equal. This is a specially important conclusion, inasmuch as Larsen began his observations with the belief that antiseptic instillations in the ear in acute otitis media were of service. Respecting the duration of the disease, the advantage was decidedly in favor of the "absolutely dry treatment with sterile cotton tampons." Those cases in which prompt paracentesis was performed healed more rapidly than those in which spontaneous perforation occurred. Fetor of the discharge set in only in those cases treated with the antiseptic drops. Granulations sprang up in eight cases, seven of which were treated with antiseptic drops in the ear and one by the dry method. Prolapse of the mucous membrane of the drum-cavity in five cases, none of which was treated by the dry method. Acute mastoiditis occurred only in cases treated by instillations in the ear.

The absolutely dry treatment, with sterilized cotton tampons, decidedly prevents complications, but it does not appear that remaining in bed has any influence either way upon the production of complications.

Chronic Suppurative Otitis Media in a Tuberculous Patient; Abscess of the Brain; Trepanation by Way of the Mastoid.—M. Coville and E. Lombard (*Ann. des mal. de l'Oreille*, etc., November, 1898) have recorded their observation of a case of abscess of the brain which they were able to open and drain by way of the mastoid and middle ear. Classical symptoms of brain abscess were wanting in this, excepting diffuse headache and intellectual hebetude. The temperature and pulse, contrary to the rule in such cases, were markedly above normal. The first operation, trepanation of the mastoid only, gave no relief. The temperature and pulse remaining unaltered, it was decided that there yet remained an unopened collection of pus in the brain. At the second operation, three days later, the antrum, aditus, and attic were exposed according to the method of Stacke-Zanfal. As the bone was found altered in appearances in the tympanic region, the aditus and the inner parts of the antrum, the tegmen tympani was cautiously opened into the cranial cavity and the dura then exposed over an area the size of a dime. The dura was then found to be congested and friable. Suddenly in the front part of this opening in the bone a thin stream of pus was seen to escape. Puncture of the dura now led to escape of pus from the cavity of an abscess in the brain, 2 to 3 cm. in depth. A small drain was then introduced into the abscess-cavity, and the wound was tamponed with iodoform gauze. On account of the weak condition of the patient he was given an injection of 1500 grammes of artificial serum. The next day the patient was free from hebetude and headache, and expressed himself as being very comfortable. However, symptoms of general metastatic pyæmia set in, and the man succumbed about two weeks after the last operation. He was far gone in phthisis when brought to the hospital for treatment of his head symptoms.

The Electric Lathe and Burr in Operations on the Mastoid and Petrous Portions of the Temporal Bone.—E. LOMBARD (*Ann. des mal. de l'Oreille*, September, 1898), after numerous trials, has formulated the following conclusions regarding the use of the electro-motor burr in operations on the mastoid and petrous parts of the temporal bone: 1. It is more exact. It does not slip as easily as the chisel and gouge, and if it does slip the result is not serious. 2. There is no risk of wounding parts that should be carefully protected, as the facial nerve, the semicircular canal, the sinus, and the dura. If one of these organs is reached the spheroidal form of the burr pushes the tissue ahead of it without cutting or wounding it. In breaking down the wall of the aditus with a burr the surgeon may dispense with the protector and almost with the probe. 3. The shock of the blows from the mallet is avoided. 4. The operation is more rapid, a fact not to be despised in an operation always long if it is to be complete. 5. The cavity made is smooth; no angles, asperities, or scales. 6. If the apophysis is eburnated, which is not uncommon in cases of chronic purulent otitis media, the burr is always successful if properly used with sufficient force. Lombard thinks the burr is specially useful in separating the sinus wall from its osseous canal. Overheating of the burr is prevented by the necessary pauses in the operation.

Thiersch's Transplantation of Flaps After Mastoid Trepanation.—KARL REINHARD (*Archiv f. Ohrenh.*, November 30, 1898) maintains that in cases in which all diseased tissue has been removed from the exposed mastoid and middle-ear cavities, after a radical operation for that purpose, transplantation of skin-flaps from the arms and legs will be followed by epidermization of the wound much more rapidly than by the method of tamponing. Transplantation of skin-flaps is, as Reinhard says, very difficult and often fails. He states that even in cases in which the flaps have all failed to adhere "that it will be found that beneath the detached flaps small gray-white points will be found from which, as secretion diminishes, cicatrization (skin) takes place."

[We cannot suppress the thought that in such cases epidermization would have occurred without transplantation of skin from the skin tissues of the region about and in the wound cavity.—ED.]

Experimental Results of Poisonous Doses of Quinine and Salicylic Acid Upon the Auditory Apparatus of Animals.—KIRCHNER (*Berliner klin. Wochenschrift*, 1881, No. xci.) claimed that doses of from one to two grammes of quinine and from three to five grammes of salicylate of soda, given to cats, dogs, and guinea-pigs, produced in a few hours hyperæmia and hemorrhages in the middle ears, the internal ears, and fourth ventricle. The large doses of quinine killed cats and dogs in from five to eight hours, death being ushered in with symptoms resembling those of suffocation. The objection was soon raised to his conclusions that the results in the ears, on which they were based, were due to strangulation and not to the poisonous effects of the drugs given the animals.

C. GRUNERT (*Archiv f. Ohrenh*, November 30, 1898) has recently made some experiments on white mice and pigoens in order to determine whether "suffocation could produce destructive changes in the auditory organ similar to those produced by Kirchner's poisonous doses of quinine, etc."

By these experiments with suffocation Grunert could produce hyperæmia of the auditory organ but not extravasations, whereas Kirchner evoked by his experimental drugs not only great hyperæmia but extensive blood extravasations in the endolymphatic spaces, functionally the most important spaces in the auditory apparatus. Grunert, therefore, believes that the "abovenamed extravasations of blood in the ductus cochlearis, for example, as produced by Kirchner, must be the result of specific, poisonous action of the drugs, induced, perhaps, through the great injury sustained by the bloodvessels of the tract under consideration."

A practical conclusion drawn by Kirchner and confirmed by Grunert is that if the internal ear is unduly congested by an overdose of quinine or salicylic acid it can never recover its function. [Caution demands the avoidance of large doses at a time to the human being.—ED.]

Acute Otitis Media.—In the acute inflammatory stage of otitis media, GORHAM BACON (*New York Polyclinic*, January 15, 1898) holds that it is important to apply the artificial leech at once, close to the tragus, and endeavor to abort the disease. If the drumhead bulge a free incision should be made into it. This should be done only under the guidance of the eye and with the aid of good illumination. If the free incision is not made and proper drainage not established there would be great danger of the otitis media becoming chronic. If the disease become chronic in the attic, the perforation should be enlarged and the endeavor made to wash out the secretion with a syringe. Granulations should be destroyed by the application of chromic acid or by the use of the curette. If this treatment failed a cure could be effected in many cases by excision of the ossicles and curetting the attic. Some of the results of chronic otitis media are the formation of granulations and polypi, caries of the ossicula and temporal bone, mastoid disease, suppurative meningitis, cerebral abscess, and septicæmia. In cases of acute otitis media, if the temperature remains high after the incision of the drum membrane and the opening of the mastoid cells, one should think of a complicating pneumonia or, perhaps, of a sinus thrombosis. In cases of acute mastoid disease the operation should not be deferred until redness and œdema of the tissues over the mastoid appear and the auricle stands out prominently from the head. In making the diagnosis the two mastoid processes should be compared, as in some persons pressure on an uninflamed mastoid process causes pain. In the first stage of mastoid inflammation, secondary to acute suppurative otitis media, after incision the artificial leech should be applied and also the Leiter cold coil; but the latter should not be left on for more than forty-eight hours, for if the symptoms have not subsided by that time immediate operation is indicated. The incision should be made close to the auricle, from the tip to the upper border of the pinna. This incision can be enlarged in both directions if complications exist. When pus is found in the antrum and upper part of the mastoid it should be remembered that the tip might contain pus, and if this is not liberated it may burrow down into the tissue of the neck and give rise to septicæmia. When caries of the tympanic roof takes place a collection of pus is frequently found in the temporo-sphenoidal lobe.

A. H. BUCK (*New York Polyclinic*, January 15, 1898) said with the early stage of acute otitis media one must choose between hot and cold applications. In his opinion, both of these agents are vasomotor stimulants, and they relieve the pain through this vasomotor action by diminishing the pressure on the sensory nerve-fibres of the inflamed part. Heat had no power to benumb sensation, while cold would do so when carried beyond a certain point. This very application of cold, therefore, served to mislead us, for it is largely by the persistence of pain that we are informed of the necessity of going further and operating. The application of ice appeared to be getting very popular in this country, and for this reason he felt called upon to emphasize the fact that it was a very deceptive agent. ROBERT ABBE (*New York Polyclinic*, January 15, 1898) said that the discussion on Dr. Bacon's paper on "Suppurative Otitis Media and its Complications" had shown most clearly the great risk of allowing a purulent otitis to go on after the onset of serious symptoms. Hemorrhage, sinus pyæmia, and cerebral abscess were the great dangers to be feared. If the mastoid was operated upon quite early the involvement of the sinus would be exceedingly slight. If, however, the operation was deferred, the signs and symptoms of sinus pyæmia would soon make their appearance—tenderness and induration along the jugular vein.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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The Action of Streptococci and of Their Toxins on the Various Organs of the Body.—The whole number of *Ziegler's Beiträge für pathologischen Anatomie*, 1899, Band xxv., Heft 1, is devoted to a study by HOMÉN and his pupils of the effect of one particularly virulent streptococcus and of its toxin on various organs of the body. The toxin was obtained in concentrated form from bouillon cultures by precipitation, either by ammonium sulphate or by amyl alcohol. The results are briefly as follows:

NERVOUS SYSTEM (Homén and Laitinen). A parallel series of experiments was made on rabbits, of which about three hundred were used. Injections either of the streptococcus or of its toxins were made into the right sciatic nerve or into the cord. The clinical symptoms varied greatly and were carefully noted. More or less paralysis of the hind leg was frequent, and in cases that lived a long time atrophy of the leg sometimes occurred.

In animals that died within a week after inoculation in the sciatic nerve with the streptococcus the nerve was usually deeply injected, swollen, and œdematous. In cases that lived longer the lesions were less marked. After injection of the toxin the mascroscopical changes were exceedingly slight.

Microscopical changes were usually found in the nerves, nerve-roots, spinal ganglia, and cord.

In the peripheral branches of the nerve-bundle the bacteria seemed from the beginning to be scattered rather diffusely in the nerve substance; in the proximal portion, however, within a very few centimetres above the point of inoculation, they were collected chiefly in the lymph space on the inner side of the perineurium, from which they penetrated gradually into the centre of the nerve-bundle along the endoneural continuations of the perineural sheath.

In the extension to the cord the organisms seemed to travel more along the posterior nerve-roots. In general they then spread very quickly throughout the intermeningeal spaces of the whole cord, collecting chiefly around the nerve-roots, and penetrated also the corresponding spaces of the brain. They got into the cord, especially along the posterior septum, but also at other points, chiefly along the pial sheaths of the bloodvessels. It is worthy of notice that lesions caused by the bacteria were sometimes localized in the neighborhood of the anterior nerve-roots, especially at the anterior edge of the anterior horns.

A week after the inoculation, sometimes earlier, no bacteria, as a rule, could be found in the cord, but they could sometimes be found as late as the seventeenth day in the injected nerve, usually, however, in a degenerated condition.

The histological lesions were closely associated with the localization of the bacteria. The effect of the bacteria, that is, of their toxins, was a diffuse change resulting in granular degeneration, followed by cellular increase due to immigration of leucocytes, and proliferation of the cells of the endoneurium and of the nerve-sheaths.

On the whole, the bacteria do not penetrate much into the spinal ganglia. The ganglionic cells showed the greatest variations in the degenerative changes of the chromophilic elements. Bacteria and pathological changes were found in general more in the posterior than in the anterior nerve-roots.

The most noticeable lesions in the cord after injection of bacteria into the nerves were the localized changes at those places where the bacteria were also sometimes found, and also the changes in the cells of the anterior horns.

It is remarkable that the distribution of the bacteria and of the lesions was practically the same, whether the injection had been made into the nerves or into the cord.

After injections of the toxins the changes on the whole were the same whether the injection was made into the cord or into the nerve.

The changes in general, as well after the injection of the bacteria as of toxin, were at first more of a degenerative nature, and were followed by inflammatory and sclerotic processes; at times the process from the beginning was more of an exudative nature.

Aside from the small differences in the histological changes and in their distribution, the lesions which occurred after injection of bacteria or of the toxin were in general so alike that it must be assumed that the chief paths of distribution of the bacteria and of the toxin are essentially the same, and that the bacteria produce their effect chiefly through their toxin.

The writers are of the opinion that their investigations to some extent favor the view that many affections of the cord—not only those of a more degenerative but those of an inflammatory character—are of an infectious or toxic nature. They believe that their work furnishes an anatomical foundation for the theory of ascending neuritis.

LIVER. BJÖRKSTÉN presents a series of cases showing the action of streptococci and their toxins in the liver.

He injected the liver in five different ways: directly into the liver, into a vein, subcutaneously, into the sciatic nerve, and by introducing a glass tube into the common bile-duct.

In order to infect the common bile-duct thoroughly a laparotomy was performed, with complete aseptic precautions, the duodenum opened, a small sterile glass tube introduced into the bile-duct, the duodenum closed, and the tube broken.

In direct injection into the liver most cases died of peritonitis and general infection. Those which did not die were killed at 1, 4, 10, 30, and 60 days after the infection.

In most of the cases there was a rise of temperature lasting from three to ten days, and considerable loss of weight.

After injection of the streptococci he found that in the cases of general infection, independent of the methods of injection, streptococci were found in the liver in those dying early, but not in those dying after the thirteenth day; they were between the liver-cells or in the capillaries; the parenchymatous cells near the clumps of bacteria, within a few days after the infection, were very often changed; round-cell infiltration and necrotic areas often occurred, and sometimes hemorrhages irrespective of these areas. The liver could be infected with streptococci through the common bile-duct without marked general infection. The streptococci in those cases so infected and examined within thirteen days could be found in and about the bile-passages, together with small-cell infiltration and often degenerative changes in the surrounding parenchyma cells.

After injection of the streptococcus toxin the general condition of the animal was impaired; there was a rise of temperature, and then the animal recovered or grew worse, according to the method of infection. Direct injection caused marked degenerative changes in the tissue.

Injection of the toxin through the common bile-duct caused degeneration and breaking up of the parenchyma surrounding the bile-passages. A loose and swollen connective tissue was formed, in the meshes of which fragments of broken-down liver-cells were often seen. There were also many round-cells and marked increase of the connective tissue cells, especially in the region near the bile-ducts. The meshes of the connective tissue stroma became gradually smaller and finally disappeared, so that a complete cirrhosis might result. Small areas of degeneration or necrosis could be caused by the injection of the toxin into the sciatic nerve or into a vein.

LUNGS. SILFVAST found that streptococci introduced into the lungs of rabbits were immediately taken up in large numbers by the epithelial cells. Fifteen minutes after the intratracheal injection of a bouillon culture numerous alveolar epithelial cells were studded with streptococci. The polymorphonuclear and large mononuclear leucocytes were less phagocytic. After the first four hours more extracellular cocci were seen, and they appeared better preserved. After the second day the micro-organisms began to degenerate, and by the twelfth day cultures from the lung were sterile.

Streptococci were found in the bronchial lymph-nodes fifteen minutes after the introduction of the organisms into the trachea. They were also demonstrable thirty-five days later.

The lungs of the rabbit were quite resistant to the action of the streptococcus. Exposure of the animal to a low temperature, or a local cooling of half the thorax, had a remarkable effect in diminishing this resistance. The inhalation of a mechanical irritant, such as powdered charcoal, had a similar predisposing action.

Both living streptococci and their toxins caused diffuse and focal changes. The pathological process began with the emigration of polymorphonuclear leucocytes, the desquamation of alveolar epithelium, and the exudation of a coagulable fluid. Later there was a diffuse infiltration consisting of various kinds of leucocytes, swollen epithelial cells, red blood-corpuscles, and a granular exudate. The alveolar structure became obscured. Finally, with the continued administration of the toxin, the affected areas became transformed into connective tissue.

HEART (TALQUIST). About fifty hearts were examined by transverse and longitudinal sections, stained principally by hæmotoxylin and eosin, and by Van Gieson's method. No fresh examinations were made.

By the injection of bouillon cultures of the streptococcus directly into the heart muscle pericarditis resulted in nearly all cases. Most animals died in two to three days. In the heart muscle small abscesses developed in some cases. In other cases there were small foci made up of necrotic muscle fibres and much round-cell infiltration. In these foci were numerous cocci. Vascular infiltration was marked and small hemorrhages frequent. Later the formation of fibroblasts was observed. Simple parenchymatous changes were not common. In a rabbit which recovered, and was killed after a month and a half, repair with abundant formation of connective tissue was observed. The foci in the heart muscle were often due apparently to direct extension from the pericarditis, but in many cases isolated foci were found in deeper portions of the wall and in the papillary muscles.

After injection of bouillon cultures into the ear-vein changes in the heart muscle were quite constant. After twenty-four hours cocci could be seen in large numbers between the muscle fibres, and this was soon followed by destruction of the muscle fibres and round-cell infiltration. Marked vascular hyperæmia was common. In some cases hyaline degeneration of muscle fibres and proliferation of muscle nuclei were seen. In later stages diffuse interstitial changes occurred. There was slight evidence of fatty degeneration.

Subcutaneous and intraperitoneal injections, and injections into the sciatic nerve, produced changes similar to the above. In several of the cases acute pericarditis and endocarditis occurred.

After the injections of the toxins into the ear-veins, even in cases with increase of temperature and loss of weight, the heart muscle frequently remained normal. Changes which did occur were parenchymatous in nature, consisting in granular changes in the fibres and in fatty, hyaline, and waxy degeneration. In later stages interstitial changes were sometimes seen. The left ventricle and intraventricular septum were the parts most frequently affected.

KIDNEYS. VON BONSDORFF presents experimental investigations on the elimination of streptococci by the kidneys. He injected twenty-four-hour bouillon cultures into the ear-vein or peritoneal cavity of rabbits, and endeavored to find how soon the organisms were present in the urine, and if any constant relation existed between the appearance of cocci in the urine and structural changes in the kidney.

The appearance of cocci in the urine was not constant. The shortest time was nine and one-half hours after injection. In five cases, with a fatal result after a period varying from seven to fifty-five days, the urine was sterile throughout. In a few cases the cocci were present for a few days and then disappeared. As a rule the colonies increased in number with the progress of the case.

Microscopical examination showed in some cases, in the outer parts of the cortex, slight desquamation of epithelium, with nuclei somewhat contracted. In older cases there occurred a slight fatty degeneration, especially in the epithelium of the loops in the upper part of the medulla. Before the fifth day, and in control sections, fat was never found here. Cellular infiltration and frank nephritis were not observed.

In those cases in which streptococci were found in the kidney by culture they were usually present in sections as well. They were found most often in the tufts, less often in the intertubular capillaries, and only very rarely within the tubules; not at all in the capsular space.

These results are too few and incomplete to settle the question as to whether bacteria can pass through normal kidneys. In the first few hours after injection there is no elimination of bacteria. This points to certain antecedent changes in the kidney.

PERITONEAL CAVITY (WALLGREN). The same virulent organism used in the preceding experiments was injected into the peritoneal cavity, and the changes produced were followed by aspirating fluid from the cavity at various intervals of time. In most of the experiments the animals died from a general infection.

The writer sums up his results as follows:

Virulent streptococci, injected even in rather small quantities into the peritoneal cavities of rabbits, can produce a fatal peritoneal infection even when the animal is not particularly susceptible.

If virulent streptococci are injected in doses below a certain minimum the peritoneum can get rid of the organism, but the abdominal wall usually becomes infected around the site of inoculation.

Streptococci of slight virulence do not develop in the peritoneal cavities of rabbits, even if present in large quantities, provided the fluid injected with them is small in amount.

The peritoneal cavity is protected chiefly by its great power of absorption, by the activity of the leucocytes in and immigrating into it, and possibly also by the function of the endothelial cells of the peritoneum.

The leucocytes aid in the battle against the streptococci by phagocytosis, by their products of degeneration, and, perhaps, also, by their secretions.

In experiments with virulent streptococci, phagocytosis occurs at the beginning of infection, is almost lacking in the following stage, when the streptococci have acquired the power to keep the leucocytes at a distance, but can return again later, apparently when the leucocytes begin to break down more rapidly.

In experiments with streptococci of slight virulence, phagocytosis persists uninterruptedly the whole time, so long as streptococcci are present in the peritoneal cavity.

The streptococci can have a disturbing effect on the leucocytes. This is shown by the alteration and disappearance of the neutrophilic granules of the polymorphonuclear leucocytes, a process most marked in the granules around streptococci included within the cells.

So long as streptococci are demonstrable in the peritoneal cavity, as well as for one to two days after their disappearance, the majority of the cells present are polymorphonuclear leucocytes. Later there is for some time a leucocytosis which is chiefly mononuclear.

[The above work is ambitious, and is illustrated with many beautiful plates, but is not complete. The blood, spleen, and bone-marrow, for instance, were not studied. The most interesting portion is that on the lesions produced in the peripheal nerves and the central nervous system. The chief criticism on the work is that it is not wholly satisfactory in the study of the finer histological changes in the various organs.—Ed.]

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OPERATIONS IN GASTRIC ULCER.[1]

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The surgical treatment of gastric ulcer is a comparatively new branch of surgery, the first operation having been performed as recently as 1881; but since that time several hundred operations for perforation of a gastric ulcer have been recorded in various parts of the world. In more recent years operations have also been proposed and successfully carried out in non-perforating cases, on account of severe hemorrhage, or because they had resisted ordinary medical treatment.

There can be no doubt of the importance of this subject to both physicians and surgeons when so great an authority as Ewald has estimated that gastric ulcer affects 5 per cent. of the population. Now, though 75 per cent. are cured by medical means, perforation occurs in from 1.2 per cent. to 12 per cent. of all cases, according to various estimates, and hemorrhage occurs in 45 per cent. of all cases, and, according to Von Leube, is responsible for death in 8 per cent. of the cases in which it occurs. In cases which escape these two complications it is not uncommon to find dilatation of the stomach from pyloric stenosis. We must therefore regard gastric ulcer as a very serious disease.

It is not within the scope of this paper to discuss the causation of symptoms of ulcer of the stomach, but rather to point out the various operations which have been done, the indications for their performance, and the chances of a successful issue.

An operation may be required in several different complications of gastric ulcer. It is absolutely and imperatively demanded in all cases of perforation of the ulcer into the general peritoneal cavity. It is also demanded in cases in which profuse hemorrhage has taken place, and has been repeated within a short interval, and in cases of oft-repeated slight hemorrhages. Finally, it is recommended in those cases which resist ordinary medical treatment, especially in those where there is dilatation of the stomach from pyloric stenosis dependent either upon cicatricial contraction within or on adhesions outside the stomach.

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[1] A paper read before the West London District Branch of the British Medical Association.

Although there may be a considerable difference of opinion about the propriety of operating in all the above conditions, all will agree with the urgent necessity for surgical interference in cases of acute perforation. I shall therefore consider this condition first. The perforation commonly occurs on the anterior surface, but may occur on the posterior, or on both surfaces. In other cases it is found at the lesser curvature and at the pylorus. The site of the ulcer is mentioned in 47 of my series of cases, and is stated to have been on the anterior wall in 36 cases, on the posterior wall in 8, at the lesser curvature in 2, and on both surfaces in 1 case. In the collection of cases of another surgeon, M. Comte, the site of the ulcer is mentioned in 43 cases, and is stated to be on the anterior wall in 28, on the posterior wall in 8, at the lesser curvature in 4, and at the pylorus in 3 cases. This gives a total of 90 cases in which the site of perforation is mentioned, with 64 on the anterior and 16 on the posterior wall, 1 with both walls affected, 6 at the lesser curvature, and 3 at the pylorus.

The symptoms of acute perforation are usually these: A patient, generally a young woman, with a history of dyspepsia and sometimes of hæmatemesis, has an attack of very acute abdominal pain referred to the epigastric, umbilical, and right hypochondriac regions. This usually occurs shortly after a heavy meal, and is accompanied by very severe shock and severe retching. Vomiting is not a constant symptom, but when present the vomit is not of large quantity and is often blood stained. The pulse is rapid and feeble, and the temperature often subnormal. The abdomen is often retracted at first, there is absence of movement on respiration, and there is great tenderness, which is often specially marked at one spot. There is a peculiar board-like rigidity of the abdominal walls, but the legs are not usually drawn up as in peritonitis due to disease of the viscera in the lower half of the abdomen. Later on it is very common to get a diminution or even obliteration of the area of liver dulness, but this, though a sign of great importance, as indicating the presence of free gas in the peritoneal cavity, is not, however, constant; it has not been noticed in a number of cases, and would scarcely ever occur in perforation of the posterior wall of the stomach. After a few hours there will often be found signs of fluid in the peritoneal cavity, as evidenced by impaired resonance in the flanks, possible fluctuation and thrill, and shifting dulness. Still later, the abdomen will become much distended and tympanitic, with a protruding umbilicus, and the signs of free fluid will be more marked; diarrhœa usually supervenes, the tongue becomes dry and cracked, the pulse wiry and running, and the temperature high. The patient will gradually sink, and dies within a few days. Occasionally the shock is so severe that the patient succumbs within a few minutes of perforation. Thus in a case recorded by Fenwick, a man died suddenly shortly after a heavy meal; at the autopsy it was found that a gastric ulcer had perforated into the pericardium.

Briefly, then, the symptoms and signs which should guide us in making a diagnosis of perforation are (1) history of previous treatment for gastric ulcer and of the occurrence of hæmatemesis, (2) the sudden onset of the pain, (3) the intense shock, (4) the board-like rigidity of the abdominal walls and the presence of a tender spot over the stomach, (5) the diminution or absence of liver dulness, and (6) the presence of free fluid in the peritoneal cavity.

In the following case, which will serve as an illustration, these symptoms and signs were well marked. A woman, aged twenty-nine years, had been treated for seven months, both in the out-patient department and by her own doctor, for gastric ulcer, and had suffered from several attacks of hæmatemesis. Under suitable diet, etc., she was improving, but on April 23d she felt very hungry, and so ate a large mutton chop; three hours after this she was seized with a sudden pain of great intensity, which doubled her up; there was slight vomiting and considerable nausea. She was seen by her doctor at once and given opium. On the next morning, as the pain still continued and the abdomen had become distended, she was sent up to the West London Hospital, where she was admitted under my care. On admission she looked very ill; her temperature was 99°; her pulse was 100 and weak. The tongue was fairly clean. The abdomen was greatly distended, especially in the epigastric and umbilical regions and in the flanks, and did not move on respiration. There was a board-like rigidity and tenderness on palpation, epecially at a spot just below the costal arch; there was a tympanitic note all over except in the flanks, where the resonance was impaired; there was an indistinct sense of thrill across the abdomen. The area of the liver and of the splenic dulness was diminshed.

In cases of perforation of the posterior surface of the stomach the symptoms will be less marked; there will, however, be as much shock and abdominal pain; but as the lesser peritoneal cavity usually becomes shut off from the general peritoneal cavity by adhesions, there will in such cases be no alteration of the liver dulness, and probably no signs of free fluid in the abdomen. If left to nature a local collection of pus will probably form, constituting one variety of subphrenic abscess, which we will discuss later.

There can be absolutely no question about the importance of an early diagnosis in cases of perforated ulcer, since the prognosis after operation is directly dependent upon the length of time which has elapsed between the occurrence of perforation and the operation. Thus in a table of 55 cases which I have collected, 33 cases recovered after operation; of these 33 we find the length of time elapsing between perforation and the operation is stated in 25 cases; of these the operation was performed within six hours of perforation in 8 cases, or one-third of the total number of recoveries; in 5 more cases it was done between six and twelve hours, and in 7 cases between twelve and twenty-four hours; in only 5 cases, one-fifth of the whole, was the operation performed at an interval longer than twenty-four hours. If we turn to the 23 fatal cases the time is stated in 17; of these none were operated on within twelve hours, 7 of the cases were operated on within twenty-four hours, 6 within forty-eight hours, and 4 at an interval exceeding forty-eight hours. Thus we find that all the cases operated on within twelve hours of perforation—namely, 13—were successful; of the 14 cases operated on between twelve and twenty-four hours one-half were cured, and of the 15 cases operated on at a longer interval than twenty-four hours only 5, or one-third, were cured. In corroboration of these statistics I would refer to Comte's series of 65 operations for perforation, with 19 recoveries; of these 19 recoveries 11 were operated on within the first ten hours, and two others at an interval of thirteen and sixteen hours respectively, while of the 46 deaths only 6 occurred in cases operated on within the first ten hours. I do not think that more striking evidence of the importance of early operation could be imagined.

Having, I think, proved to you that no delay should be allowed to occur before operating, I will briefly describe the necessary procedure. As a great amount of shock is always present in these cases, we must take special precautions to minimize the shock caused by the operation itself. The patient must be kept warm; if in hospital, a hot-water table should be used; but if this is not available, the patient should be packed round with hot-water bottles, and the limbs should be encased in warmed cotton-wool and flannel bandages. A brandy enema is often required before the operation, and occasionally the intravenous injection of a couple of pints of normal saline solution. No very energetic means can be employed to render the skin of the abdomen aseptic, on account of the great tenderness, but it may be gently washed with soap and water, a compress soaked in a 1 in 20 carbolic acid solution applied; when the patient is under the anæsthetic the skin should be thoroughly scrubbed with a nail brush, then with turpentine, and finally with 1 in 20 carbolic acid solution again. An incision three inches long is made either in the left linea semilunaris, or in the middle above the umbilicus. I rather prefer the former position. On opening the peritoneum there will usually be a large escape of gas, of stomach contents, and of purulent fluid if the ulcer has perforated on the anterior surface of the stomach. A search is then made for the perforation, which may be found about the centre of the anterior surface of the stomach, or near the pyloric end or lesser curvature. In either of these last-named positions it will be more or less concealed by the liver, but some lymph and recent adhesions in this position will usually indicate the site of the lesion. In cases in which there is extravasation of the stomach contents the adhesions should be separated, exposing the ulcer, which will then be seen or felt by the finger. After sponging away any extravasated contents the stomach-wall in the neighborhood of the ulcer should be brought forward as far as possible by grasping the edges of the ulcer with catch forceps. No attempt should be made to excise the ulcer, but it should be invaginated, and the adjacent part of the stomach-wall brought together over it by one or two rows of Halsted's or Lembert's sutures. The sutures must be passed a considerable distance from the ulcer, otherwise they will cut out on account of the friability of the stomach-wall close to the ulcer. The peritoneal cavity should then be thoroughly flushed out with normal saline solution (one teaspoonful of common salt to a pint of boiled water), and if the gastric contents have reached the lower part of the abdomen it will be necessary to make a counter opening above the pubes and irrigate Douglas's pouch in addition. Special care must be taken to irrigate thoroughly the upper surface of the liver and the region of the spleen, in order to prevent the formation of a subphrenic abscess, a complication which marred the success of a case of my own and of two other cases on my list. The abdomen having been well flushed out, a rubber drainage tube is inserted in the upper incision, and a gauze drain is placed over the site of perforation, the rest of the wound being closed in the ordinary way; finally, a glass drainage tube should be inserted into the Douglas pouch through the counter opening above the pubes. If with strong signs of perforation no extravasation is found in the general peritoneal cavity, but there is some injection of the peritoneum, we should suspect the rupture of an ulcer on the posterior surface of the stomach; to reach this, after shutting off the general cavity with sponges, the gastric-colic omentum must be torn through, which will open up the lesser cavity of the peritoneum. If there are no signs of extravasation in the lesser cavity, we may assume that no perforation has taken place, or that sufficiently firm adhesions have already formed. If extravasation be present, we must search for the ulcer, which when found should be sutured after invagination; the lesser cavity must then be carefully irrigated, especial care being taken to clean thoroughly the portion above and behind the liver. The general peritoneal cavity will probably not be soiled, and so will not require irrigation. The wound will then be closed, with the exception of a drainage tube in the lesser cavity.

In either case the operation, of course, must be performed as rapidly as possible, so as to minimize the shock. After the operation the patient should be fed by nutrient enemata and suppositories for the first three or four days, and then feeding by the mouth may be cautiously commenced with preparations which are already partially digested and which leave little residue. The gauze drain and the suprapubic tube should be removed at the end of three days, but the rubber tube should be left in for a few days longer.

When adhesions have formed previous to perforation we may have a communication established with the colon, the pericardium, or with the small intestine, or a localized abscess which will probably be in one of two positions, but in any case is termed subphrenic. In perforation of the anterior surface of the stomach the abscess first forms between the stomach and the under surface of the liver, and then, when prevented from getting into the general peritoneal cavity by reason of adhesions, passes up between the liver and the diaphragm, and forms a tumor just below the costal arch. In perforation of the posterior surface of the stomach the abscess first forms between the stomach and the anterior surfaces of the pancreas and the duodenum; it then passes upward between the posterior surface of the liver and the diaphragm, and if it comes to the surface it will do so between the stomach and the transverse colon; it may, however, perforate into the thorax, forming a pneumopyothorax. If either of these varieties form a swelling in the abdomen they had best be opened in the middle line as high up as possible; in the anterior variety the abscess will be opened at once; in the posterior variety it will be necessary to tear through the gastro-colic omentum in order to reach the abscess. In either case a drainage tube should be inserted, and though some flushing of the cavity is advisable, this must be done with extreme care, so as to avoid breaking down adhesions. In cases in which no abdominal swelling exists, but there is dulness over the left lower costal region, the abcess can best be reached by resection of the eighth and ninth ribs in the axillary line; the pleura, of course, is opened, but the diaphragmatic is sutured to the costal pleura before the diaphragm is divided. The abscess is then drained through this incision.

Before passing on to the statistics of these operations, I would point out to you the risk of mistaking a severe attack of colic, accompanied by collapse and associated with a history of gastric ulcer, with a perforation of the stomach. I have performed an abdominal section in such a case, and on two occasions recently I have been urged to operate in such cases, all of which subsequently recovered without a bad symptom. I would also refer to two cases recorded by Bennett and Tuffier, in which an operation was performed on account of symptoms of perforation, an ulcer on the anterior wall being found in each case, but perforation had not taken place. In the first case the ulcer was excised, and in the second a gastro-enterostomy was performed, both being successful.

The main factors in making a diagnosis in these cases will be the absence of any interference with the liver dulness, the absence of board-like rigidity of the abdominal walls, the absence of signs of fluids, and the smaller amount of shock. However, in real doubt it is better to open the abdomen than to run the risk of leaving a perforated ulcer till too late for a successful result, since the exploratory incision is practically devoid of risk. In these cases a surgeon should not be considered as a mere carpenter, to be called in only to operate, but he should see the case at as early a period as possible, in order to aid in settling the question whether perforation has taken place. I regret to say that in two cases recently, on account of the time taken in making a diagnosis of perforation and deciding to call in surgical aid, the patients both died before I could do an operation.

With regard to subphrenic abscess, I will mention a very interesting case, in which an empyema originated from this cause. A man, aged thirty-five years, who had previouly suffered from flatulence and slight gastric pain, but who had had no definite symptoms of gastric ulcer, suddenly developed chest symptoms, and coughed up a quantitiy of pus. This continued, and the temperature became hectic; he was admitted to the West London Hospital under Dr. Ball, who diagnosed an empyema, which had burst into the bronchus, and asked me to explore for it. I accordingly resected a portion of the ninth rib in the axillary line, and evacuated some very fetid pus. A week or so after the operation the patient ate some figs, and some of the seeds were found in the dressings. In order to test whether a communication existed between the stomach and the abscess cavity, some methyl-blue was given by the mouth, with the result that the pus from the wound was tinged with blue. We therefore came to the conclusion that there was a communication between the stomach and the abscess, and consequently the case was one of ruptured gastric ulcer, in which a subphrenic abscess had formed, and had burst into the pleura. The patient did well. A similar case has been recorded by Mackenzie, which was successfully treated in the same manner.

STATISTICS OF OPERATIONS FOR PERFORATED ULCER. I have collected and tabulated the cases of operation for gastric ulcer which had perforated into the general peritoneal cavity and have been recorded during the last two years. They amount to 55 cases, of which 33 were cured, a mortality of 40 per cent. This percentage is low compared with other tables, but all these cases have been done within the last three years, and, moreover, they cannot be regarded as an absolute guide to the chances of recovery, since surgeons are much more prone to record successful than fatal cases. If we examine the tables of other authors we find the mortality much greater; thus Mickulicz records a series of 103 cases with 33 recoveries, or a mortality of 67.9 per cent.; Parisier records 99 cases with 33 recoveries, a mortality of 66.6 per cent., and Comte mentions 65 cases with 19 recoveries, or a mortality of 70.76 per cent. If all these series be added together, we shall, of course, be certain to record some cases several times over, but the result ought to give a good idea of the mortality; we should then have 494 operations with 172 recoveries, or a mortality of 65.2 per cent. Now these series contain cases which were operated on many years ago, and those of Mickulicz clearly show the improvement which has taken place in recent years, for out of his 103 cases 35 cases were operated on before 1894, with only one recovery, or a mortality of 97.15 per cent., while 68 cases have been operated since that date, with 32 recoveries, or a mortality of 52.94 per cent. Now if my series of cases, which are all recent, be added to the recent ones of Mickulicz, we should have a mortality of 47.15 per cent.

With regard to the success of operations for subphrenic abscess, I find records of 3 cases of primary operation for this condition during the last two years; 2 of these recovered; there were also 3 other cases in which a subphrenic abscess formed after an operation for perforated ulcer, all of which died. Comte gives 23 cases with 11 cures, Barling 6 cases with 2 cures, making a total of 32 cases with 15 cures, or a mortality of 53.1 per cent. We may therefore consider that the chances of success are no better, if as good, as in operations for perforation into the general peritoneal cavity.

The next indication for operation is hemorrhage. Some interference may be called for (1) in cases of repeated severe hemorrhage which threaten life, and (2) when there are frequent small hemorrhages, as shown by the occurrence of coffee-ground vomit and tarry stools; in such conditions an operation is to be recommended when there is marked anæmia produced, and especially when there are signs of dilatation of the stomach. Although hemorrhage occurs in from 30 to 45 per cent. of all cases of gastric ulcer, only a small proportion of cases require operation When the hemorrhage is only slight and infrequent, or when, though severe, it is not repeated, the case will be better left to medical treatment; on the other hand, I would warn you not to allow a patient to become too debilitated and anæmic before calling in surgical assistance.

There is a large choice of operations in this condition; among these may be mentioned (1) resection of the ulcer, (2) the application of a purse-string suture around the ulcer without excision, (3) gastro-enterostomy, and when the ulcer involves the pylorus, (4) pyloroplasty, and (5) pylorectomy.

The first mentioned operation—namely, resection of the ulcer—is now seldom attempted on account of its high mortality; thus Mickulicz reported 4 cases with 3 deaths. The second method is much to be preferred, and has been followed by greater success; the third method, gastro-enterostomy, aims at giving complete rest to the ulcer by relieving the pyloric spasm, and so putting an end to any dilatation of the stomach, with consequent stretching of the base of the ulcer; the fourth and fifth methods have been successfully employed when the ulcer has involved the pylorus, but they appear to be rather too severe operations even in these cases.

In cases of hemorrhage I would recommend that after performing laparotomy the stomach should be opened and emptied of its contents. If an ulcer can be seen, and its base is not contracted by adhesions to neighboring parts, it should be surrounded by a purse-string suture, so as to constrict its base. If the ulcer be adherent it should not be sutured, but a gastro-enterostomy should be performed; if no ulcer is seen the stomach should be inverted like the finger of a glove, and a search made for a superficial abrasion; this, when found, should be surrounded by a purse-string suture. It is noteworthy that in 7 cases of hemorrhage so severe as to threaten life only a superficial ulceration was present, and the failure to recognize this at the operation was responsible for a recurrence of the hemorrhage, and a fatal issue in at least 2 cases; moreover, in 2 cases of sudden death from hæmatemesis only a superficial ulceration was found at the autopsy.

As a last stage of the operation, it will be advisable to perform gastro-enterostomy in any case in which there is the slightest tendency to dilatation, in order to insure rest to the ulcer. No abdominal drainage will be needed, but the after-treatment will be carried out in much the same way as after an operation for perforation.

STATISTICS. These are not very satisfactory. I have collected 21 cases of operation for hemorrhage with 8 recoveries and 13 deaths, or a mortality of 61.9 per cent.; of these 6 were cases of excision of the ulcer and suture with 3 deaths, 12 were gastro-enterostomies with 8 deaths, 2 were cases of applicaton of a purse-string suture with 1 death, and 1 case each of pylorectomy (fatal), ligature of the coronary artery, and cauterization of the ulcer (both successful). Hartman records 12 cases with 8 deaths, or a mortality of 66.6 per cent. It is needless to say that up to the present this operation has only been performed on patients who were practically moribund, and so the high death-rate is not surprising.

We have now to discuss the question of operation for those cases of gastric ulcer which resist ordinary medical treatment, and for those in which there is dilatation of the stomach in consequence of cicatricial contraction of the pylorus. These may well be considered together since in most cases which resist medical treatment some dilatation of the stomach will be found to have taken place. According to the statistics of Von Leube an operation will be required in only a few cases, for out of 1000 cases of gastric ulcer which he had treated 750 were cured by medical treatment, 210 improved, 16 derived no benefit, and 24 died.

According to these statistics an operation would be required in only about 4 per cent. of all cases, but might be permissible in a further 21 per cent. under certain circumstances. Thus in a case of old-standing ulcer, in which the patient is unable or unwilling to follow the necessary diet, an operation may be offered to the patient; secondly, in cases of severe pain, progressive emaciation, and vomiting, or where the patient does not appear to get any better, an operation will be indicated; lastly, in cases of dilatation of the stomach, either from actual ulceration or cicatricial contraction, especially if a tumor be felt in the pyloric region, some operation is demanded. I should here mention that many cases of gastric ulcer in the neighborhood of the pylorus, accompanied by inflammatory thickening and causing dilatation, have been diagnosed and treated as cases of new growth; this is especially apt to occur when the glands in the hilus of the liver are affected, although these glands are often affected in consequence of gastric ulcer. I have made this mistake in two cases, in one of which there was a large swelling at the pylorus, with enlarged glands in the hilus of the liver; as I thought the growth too extensive for removal, I performed a gastro-enterostomy; at the end of one year the tumor had disappeared and was replaced by a cicatricial tissue; in the other the pylorus was occupied by a fibrous ring, the result of old ulceration; this case was cured by Loretta's operation.

The occurrence of dilatation of the stomach in cases of ulcer at the pylorus is generally admitted; but it is further urged by Olivier that pyloric spasm often exists in cases of ulcer in other parts of the stomach and is due to the hyperacidity of the gastric contents so frequently met with in these cases. The fact that dilatation of the stomach undoubtedly impedes the healing of a gastric ulcer, and that its treatment by the passage of a stomach tube and lavage is contraindicated in ulceration, is used as the chief argument in favor of the performance of gastro-enterostomy in cases where dilatation is present.

The operations which may be performed in these cases are (1) gastro-enterostomy, (2) pyloroplasty, (3) pylorectomy, and (4) Loretta's operation. The last named is not very satisfactory, and the third is too severe for an ordinary case, but may be required in cases where pyloroplasty has been attempted, but the parts have been found too friable to hold the sutures. The choice of operation will therefore lie between gastro-enterostomy and pyloroplasty, and opinions are fairly evenly balanced in favor of each.

In either operation the abdomen is opened either in the middle line or by a transverse incision parallel to the costal arch. If gastro-enterostomy is to be performed, it is desirable to attach the jejunum to the posterior surface of the stomach. The posterior surface of the stomach is exposed either by tearing a hole in the gastro-cœlic omentum or by turning up the colon and great omentum. The first part of the jejunum is then sought for, and is applied to the posterior surface of the stomach, being united preferably by sutures, all of which should be passed before either gut is opened. Care should be taken to make a sufficiently large opening between the two visceræ, on account of subsequent contraction of the stomach. The parts are then replaced and the abdominal wound closed. The methods of performing the anastomosis, which should always be a lateral one, are very numerous, and include the use of various apparatus, such as Mayo-Robson's and Allingham's bone bobbins, Senn's plates, Paul's ring, etc. Personally, I prefer and have always practised simple suture with mattress sutures.

If pyloroplasty is to be performed a horizontal incision is made over and into the pyloric orifice, and this incision is sutured in a vertical direction, producing a large pyloric opening. Bone bobbins, etc., may be used to assist the suture. The after-treatment of these operations differs little from that of other operations on the stomach, except that in uncomplicated cases feeding by the mouth may be commenced after forty-eight hours.

Statistics. The success of these operations has undergone a great improvement during the last few years; thus, while Cutler and Elliott and Grieg Smith estimate the mortality of gastro-enterostomy at 30 per cent., Mickulicz estimates it at 16 per cent., with a series of 68 recent cases. If we examine the cases recorded during the last two years, including a series of 21 successful cases by Doyen, we shall have 63 cases with 4 deaths, or a mortality of 6.4 per cent. If Mickulicz's collection is added to mine we have 131 cases with 15 deaths, or a mortality of 11.5 per cent.

With regard to pyloroplasty, which is a more modern operation, the results are slightly inferior. I have collected 109 cases with 17 deaths, or a mortality of 15.5 per cent. Mickulicz records 76 cases with a mortality of 13 per cent., while Cutler and Elliott estimate it at 12 per cent. If we add Mickulicz's cases to my collection we have 185 cases with 27 deaths, or a mortality of 14.5 per cent. I have not many statistics for the other operations, but Cutler and Elliott estimate the mortality after pylorectomy at 35 per cent., and that after Loretta's operation at 15 per cent. If we now add all the cases of all these operations we have 242 operations for gastric ulcer and its complications, other than perforation and hemorrhage, with 32 deaths, or a mortality of 12.4 per cent.

The last condition in which an operation may be required is when adhesions have formed, after the cicatrization of a gastric ulcer, between the stomach and neighboring organs, such as the liver, the spleen, the transverse colon, the omentum, the small intestine, or the anterior abdominal wall. If the adhesions are in the region of the pylorus they will probably cause a kink, and so produce dilatation of the stomach; when in other parts of the stomach they may produce persistent vomiting or only severe pain. In my experience this pain from adhesions is worse in the early morning before food has been taken. The following illustrates the class of cases where pain is the only symptom: A woman, aged forty years, had been under treatment in hospital for eight weeks for gastric ulcer accompanied by severe hæmatemesis. Although there had been no further bleeding since admission, she suffered from severe attacks of abdominal pain, which were more marked in the early morning. As these attacks of pain became more frequent and more severe, although the patient was kept in bed and on a limited diet, an exploratory operation was performed, and adhesions between the stomach and omentum were found.

The treatment consists in opening the abdomen in the middle line and examining the surface of the stomach; if adhesions exist between the omentum and the stomach, the omentum should be divided between two ligatures, as was done in my case; if adhesions exist with other organs, they had better be carefully separated with the finger, and if the surface of the stomach then shows a thin cicatrix, it will be best to invaginate and suture the scar, so as to avoid the risk of a subsequent perforation.

I am afraid that I cannot give you any statistics of this operation, but the mortality should be practically *nil,* since no important parts are interfered with. I have performed two such operations myself, and two others have been recorded by Mayo-Robson and Clive-Low, all of which were successful.

I think that this concludes the list of operations which may be required in the treatment of gastric ulcer. Mickulicz states that the mortality of operations in gastric ulcer does not exceed 10 per cent., and if all my statistics are massed together, with the exception of those which are known to have been operated on before 1894, we have a series of 422 operations for gastric ulcer and its complications, with 71 deaths, or a mortality of 16.5 per cent. When we compare these results with those of treatment without operation—namely, Von Leube's series of 1000 cases with 75 per cent. of recoveries—we ought only to compare them with the results in the 250 cases which were not cured.

Out of these 250 cases, 24, or 9.6 per cent. died, and a further 16, or 6.4 per cent., derived no benefit, making a total of 16 per cent. which either died or resisted treatment; the mortality of my collection of cases —namely, 16.5 per cent.—does not compare unfavorably with these results, especially when we remember that a considerable number of my cases were almost moribund when the operation was performed. I feel confident that when surgical interference is practised earlier we shall have very much better results, and I believe that with a better knowledge of what surgery can do in these cases, practitioners will be only too glad to avail themselves of its assistance at an early period of the case. To show how little the urgent necessity for early operation, even in cases of perforation, is recognized, I would refer you to a report of eight autopsies on cases of perforated ulcer recorded by Sutherland, in only one of which was an operation performed, and this too late to have much chance of being successful. Had these cases been operated on about one-half would probably have recovered.

In conclusion, I would briefly recapitulate the class of cases of gastric ulcer in which an operation should be done:

1. In all cases of perforation at the very earliest possible moment; also in subphrenic abscess.

2. In cases of hemorrhage (*a*) when there is continual oozing of blood, especially if the stomach be dilated, and (*b*) in cases of repeated severe hemorrhage.

3. In cases where there is severe pain and vomiting unaffected by treatment, and which is producing progressive emaciation.

4. In cases of dilatation of the stomach from contraction within or from adhesions outside the stomach.

The operations to be performed are: In class 1, laparotomy and suture of the ulcer; in class 2, gastrotomy and suture of the ulcer, with a purse-string suture, combined with gastro-enterostomy; in class 3, gastro-enterostomy, in order to give physiological rest to the ulcer; and in class 4, either gastro-enterostomy, or, if the pylorus be affected, pyloroplasty or pylorectomy.

As the surgery of gastric ulcer is a comparatively new subject, I have had, so to speak, to make a case in its favor. It has been my endeavor to show that no patient ought to be allowed to die either from perforation, or from hemorrhage from a gastric ulcer, without a surgical effort being made to save him; that the earlier such effort is made the better the chance of success, and, finally, that surgery offers much hope of success in other cases which resist the art of the physician.

General Statistics.

Collected by	Nature of operation.	Cause.	No. of cases.	Cured.	Died.	Percentage of mortality.
Bidwell,	For perforated gastric ulcer.	General peritonitis perforation.	55	33	22	
Comte,	" " "	" " "	65	19	46	
Barling,	" " "	" " "	31	11	20	
Le Dentu,	" " "	" " "	25	5	20	
Chaput and Mauclair,	" " "	" " "	45	15	30	
Houzé,	" " "	" " "	67	20	47	
Mickulicz,	" " "	" " "	103	33	70[1]	
Schwartz,	" " "	" " "	23	3	20	
	Total		414	139	275	66.42 per ct.
Comte,	Incision and drainage of abscess.	Subphrenic abscess.	23	11	12	
Barling,	" "	" "	6	2	4	
Bidwell,	" "	" "	4	3	1	
	Total		33	16	17	51.51 per ct.
Marion,	Operations for hemorrhage.	Severe or repeated hemorrhage.	9	3	6	
Bidwell,	" "	" " "	12	6	6	
	Total		21	9	12	57.14 per ct.
Carle and Fantino,	Gastro-enterostomy.	Dilatation or pain.	24	22	2	
Doyen,	" "	" "	21	21	...	
Doyen,	" "	" "	12	11	1	
Mickulicz,	" "	" "	68	57	11	16 per ct.
Bidwell,	" "	" "	5	4	1	
	Total		130	115	15	11.53 per ct.
Carle and Fantino,	Pyloroplasty.	Dilatation or pain.	14	13	1	
Mikulicz,[1]	"	" "	76	66	10	13 per ct.
Corraza,	"	" "	53	47	6	
Comte,	"	" "	38	29	9	
Bidwell,	"	" "	4	3	1	
	Total		185	158	27	14.7 per ct.
	Grand total		783	437	346	44.18 per ct.

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[1] Before 1894, 35 cases, 1 cured. After 1894, 60 cases, 32 cured.

EPITHELIOMA AS A SEQUEL OF PSORIASIS AND THE PROBABILITY OF ITS ARSENICAL ORIGIN.[1]

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IN November, 1898, Miss M., aged thirty-five years, came under my professional care through the kindness of Dr. H. W. Stelwagon, whose patient she had been for many years, but who no longer found it convenient to look after her. At that time she presented the following lesions: On the outer side of the heel of the left foot was an ulcer about two inches in diameter, shallow at the edges but quite deep in the centre, with a perfectly flat, uninfiltrated border. Close by this large ulcer, which was very painful, was a much smaller, very superficial one, which was evidently undergoing cicatrization. In addition to these ulcerative lesions the soles of both feet were the seat of a marked keratosis, which existed as diffuse patches upon the heels, and shot- to pea-sized, clavus-like elevations, most numerous beneath the metatarso-phalangeal articulations. The palms of both hands were also the seat of a keratosis even more marked than the soles, the palmar surface of the fingers presenting numerous shot-sized, corneous elevations, while the centre of the palms was dry and thickened. Besides these keratosic lesions there were several small, superficial ulcers upon the palmar surface of the fingers, which had originated at the site of corns and were quite painful. Upon the elbows and trunk were a few patches of psoriasis, which presented nothing unusual. Upon the left breast was an irregularly oval, quarter-dollar-sized, red, somewhat thickened, slightly crusted patch, which was just beginning to ulcerate in small areas. In the left groin was a bosselated tumor the size of a small orange, firm and elastic, except upon the summit, where the skin was evidently upon the point of giving way. The history of the case, as obtained from Dr. Stelwagon and the statements of the patient herself, was as follows: At fourteen years of age she began to have psoriasis of the ordinary type, from which she had never been entirely free since, and for which she had taken arsenic in considerable doses over long periods of time. Some nine or ten years after the first appearance of the psoriasis horny patches and corn-like elevations began to appear in the palms of the hands and on the soles of the feet, and at a still later period—how soon after the keratosis I was not able to learn accurately—small, superficial ulcers occurred beneath these horny masses, which obstinately refused to heal under any kind of treatment. At this time an ulcer appeared upon the left heel (Fig. 1), near the site of the one above described, which, after being treated in vain with various local applications, was thoroughly curetted by her medical attendant and healed entirely. One year later a new one appeared, which slowly but steadily extended until the patient's death, uninfluenced in its progress by treatment. Seven months before the date of my first visit the tumor in the groin began, and this steadily, at first slowly, but later more rapidly, grew larger. The history from this time on can, unfortunately, be told in a very few words. The tumor in the groin speedily ulcerated, forming a deep, fungating, foul ulcer, which discharged very abundantly. This was soon followed by more or less continuous fever, loss of appetite, rapid emaciation, and death about two months after my first visit. During the short period the patient was under my observation the large ulcer upon the heel underwent but little change, but the one alongside of it, and another upon the palmar surface of the middle finger of the left hand, which was unusually painful, were completely cicatrized some little time before death occurred, both having lasted many months. The few patches of psoriasis present at an earlier period also completely disappeared. Soon after taking charge of the case I excised a small portion of the margin of the ulcer upon the heel, and submitted it to microscopical examination. This fully established the carcinomatous character of the lesion. There were many well-defined, slender, branching tracts of epithelial cells extending well down into the corium, a considerable number of epithelial cell-nests, and a scanty infiltration of round cells. (Fig. 2.) Sections of the secondary tumor in the groin, made after death, showed it to be composed of epithelial cells contained in thin-walled alveoli. While I think we may assume that all the ulcerative lesions were of the same character, I regret that this was not established beyond doubt by sections of the smaller ones; but this precaution was in some manner overlooked.

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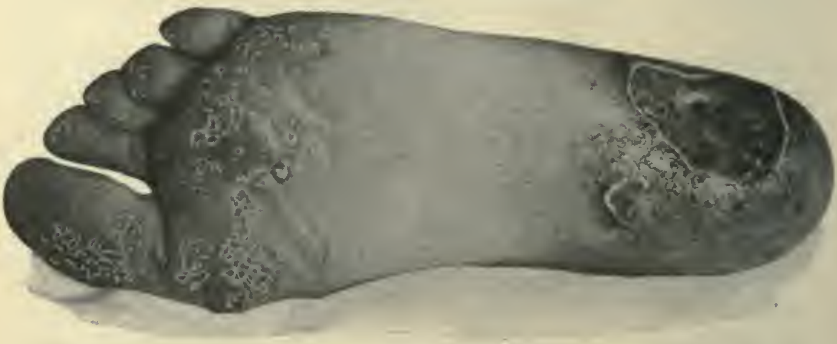
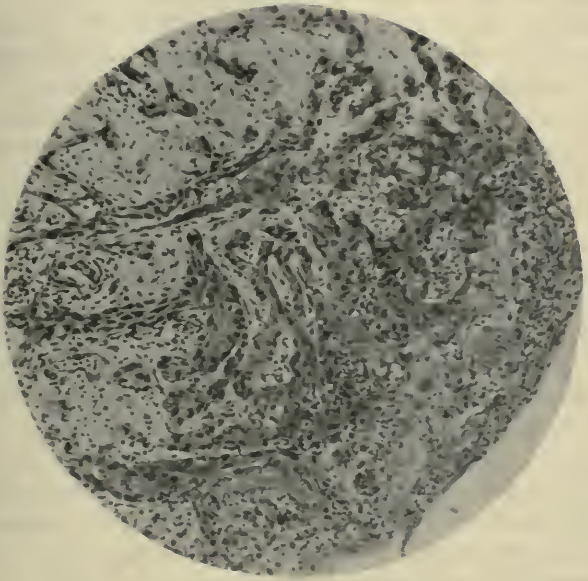
[1] Read at the twenty-third annual meeting of the American Dermatological Association, May 30, 1899.

FIG. 1.



To sum up the leading features of this very interesting case, we have a psoriasis, first, of the ordinary kind, lasting many years, for which arsenic was taken in considerable doses for long periods; after a time keratosis of a peculiar type upon the palms and soles, characterized by the formation of clavus-like elevations; and, finally, epithelioma at the site of several of these corneous lesions, followed by a metastatic growth in the groin, causing the death of the patient.

FIG. 2



The first case of epithelioma associated with psoriasis of which I have been able to find any record was reported by Pozzi[1] in 1874. The patient was a man, aged forty-five years, who had suffered twenty-five years from confluent psoriasis. There was also psoriasis of the nails, with considerable hypertrophy of the subungual derma. The epithelioma, which was of very slow evolution, began as a small excoriation upon the foot five years after the appearance of the psoriasis. In addition to the hypertrophy of the nails, already alluded to, there were epidermic warts.

A few years later Cartaz[2] reported a second case. A man, aged forty years, had had psoriasis twenty-three years, first appearing upon the elbows, then upon the soles of the feet, and, finally, upon different parts of the body. Upon the palms and soles the psoriasis had produced verrucose scales, varying in size from a pin-head to a lentil. In consequence of repeated scratching of one of these warty elevations upon the palmar surface of the right ring finger it was torn away, producing an ulcer which, instead of healing, gradually enlarged. A diagnosis of "cancroïde" was made, and amputation performed. In neither of these two cases is any mention made of the kind of treatment employed, if any, against the psoriasis.

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[1] Bulletin de la Société Anatomique de Paris, 1874.

[2] Ibid., 1877.

In 1885 a distinguished member of this Association, Dr. J. C. White, reported two cases of long-standing psoriasis, followed by wart-like growths, which terminated in carcinoma.[1] In the first of these the patient was a man in whom psoriasis began at twenty-one years of age, and was constantly present from that time on in a greater or less degree, notwithstanding treatment by Fowler's and Donovan's solutions. After about fifteen years' duration several of the psoriatic patches began to undergo keratosic change, being finally converted into outgrowths like callosities or some form of wart. Some years later one of these wart-like outgrowths seated upon the right palm, and another upon the left, began to ulcerate, and in spite of various applications, cauterization, and scraping, gradually grew larger. Finally, as a last resort, the right hand and the fore and middle fingers of the left were amputated. A microscopical examination established the diagnosis of cancer. The second patient was also a man, aged fifty-two years, who had suffered from psoriasis since early manhood, for which various methods of treatment had been tried, including arsenic. At about forty years of age several of the patches of psoriasis upon the hands became thickened and horny in appearance, and were finally transformed into warty outgrowths, one of which, upon the palmar surface of the wrist, softening formed an ulcer two by one and a half inches, which refused to heal in spite of repeated cauterizations and scrapings. There was also a warty formation which was beginning to soften between the fingers. There was a small ulcerating patch upon the buttocks and two small crusted excoriations upon the penis and in the groin respectively. The diseased tissues were thoroughly excised, and healing was progressing favorably, when a deep cellulitis of the axilla, accompanied by grave constitutional symptoms, suddenly developed, causing the death of the patient. In this case, as in the preceding one, the clinical diagnosis of cancer was confirmed by the microscopical examination.

In 1887, at a meeting of the Pathological Society of London, Mr. Jonathan Hutchinson[2] reported three cases of psoriasis which terminated in carcinoma; but one of these, as it appered later, was the first case, already reported by Dr. White. Mr. Hutchinson's first case occurred in a man whose psoriasis had lasted for many years, and for which he had taken arsenic. A corn, after a time, appeared upon the sole of the foot, which ulcerated, and the ulcer continuing to enlarge in spite of treatment, it was excised. A microscopical examination of the excised lesion was inconclusive as to its nature. Small corns had also developed upon the palms of the. hands. The third case was also a man, aged thirty-four years, with a long-standing psoriasis, for which he had been treated with arsenic for a long time. Small corns were scattered over the palms and soles. After a time epithelial cancer of the scrotum developed. To these cases he has recently added another.[1] The patient was a man, aged forty-six years, who had suffered from psoriasis from boyhood, for which he had taken liberal quantities of arsenic for many years. After a time cancerous ulceration of two patches of psoriasis, one on the abdomen the other on the back, developed, and this was followed by a glandular growth in the groin, which ulcerated, forming a large excavation. The patient finally died from exhaustion. Although the palms were harsh and dry no actual keratosis was present.

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[1] AMERICAN JOURNAL OF THE MEDICAL SCIENCES, vol. lxxxix.

[2] British Medical Journal, December 10, 1887.

Hans Hebra[2] has reported a case of multiple epitheliomatous lesions occurring in a man who had been the subject of psoriasis for many years. The psoriasis, which at first did not differ from the ordinary type, after a time assumed a warty character, requiring mechanical means to remove the epithelial deposits. Three years after the patient was first seen the warty excrescences split up, causing fissures and deep losses of substance. Ulcers appeared upon the arm and thigh which refused to heal. One of these upon the thigh was excised, but soon returned. Fever and rapid loss of strength ensued, and the case terminated fatally. No details as to the treatment of the psoriasis are given. Examination of the excised parts demonstrated the epitheliomatous character of the ulcers.

Arbuthnot Lane[3] has also reported a case of multiple epithelioma occurring in a psoriatic man, aged sixty years, who had taken arsenic for thirty years. On the forearm was an ulcerating epithelioma two inches in diameter. This was removed, but one year later three separate epithelial growths appeared upon the scrotum and perineum, and these were soon followed by two other raised plaques in the same locality. These lesions were excised and found to be epitheliomatous. A month or two later two new typical epithelioma were removed from the scrotum. Altogether the patient had eleven separate foci of malignant growths—four on the forearm, seven on the scrotum and perineum—but in only one, near the anus, did the growth seem to arise in a patch of psoriasis.

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[1] Archives of Surgery, 1898.

[2] Monatshefte f. praktische Dermatologie, January, 1887.

[3] British Medical Journal, February 9, 1894.

Geyer,[1] in the very extensive bibliography appended to a recent paper upon the chronic changes induced in the skin by arsenic, refers to a case of carcinoma of the hands arising from a plaque of psoriasis, reported by Power. Beyond the statement that the case was regarded as one of cancer, probably due to arsenic, no details are given, and I have been unable, to my great regret, to find the original report, although it was diligently searched for.

These ten cases, which, after a careful search, I believe comprise all thus far reported, together with my own, present a remarkable uniformity in their clinical features and course. In all of them the psoriasis, which at first presented the ordinary type of eruption, was of long standing, usually many years; in all but three some form of keratosis was a marked feature, appearing after a variable period, most frequently upon the palms and soles in the shape of corn-like excrescences, and finally cancerous ulceration, beginning beneath one or more of these horny excrescences, occurred. In all in which any mention is made of the treatment of the psoriasis—eight out of the eleven—arsenic had been given in considerable quantity for a long period; and, in view of its almost universal use in this malady, its administration in the remaining three cannot be positively excluded. It deserves special notice, that in a large proportion of the cases—50 per cent.—the cancerous ulceration appeared before forty years of age—in one, that of Pozzi, as early as twenty-five—and it is also remarkable that in the same large proportion—50 per cent.—the ulcerative lesion was multiple. The early appearance and multiple character of the carcinoma accompanying psoriasis would seem to point to some special etiological factor.

While the whole number of cases is a small one, yet it is too large to permit the assumption that the association of these two diseases was entirely an accidental one. When Mr. Hutchinson reported the two cases referred to above, it was in support of the statement made by him that arsenic given in large doses for a considerable time might produce a form of epithelial cancer. Upon the same occasion he referred to a case, communicated to him by Allbutt, in which a young lady who had taken arsenic for many years for pemphigus, with only occasional remissions, after a time developed an ulcer upon the crest of the ilium. Following the development of this ulcer, the glands enlarged and a tumor appeared upon the thigh, causing the patient's death at twenty-five years, an extremely early age for death from carcinoma. Some years later he reported another case, under his own observation,[2] in which a man, aged thirty-five years, became the subject of keratosis of the palms, which was followed by cancer of the palm and scrotum. This patient had taken considerable quantities of arsenic for acne. It should be noted, too, that the ulcerative lesions were multiple.

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[1] Archiv f. Derm. und Syph., Bd. xliii.

[2] Archives of Surgery, vol. v.

But prior to these observations of Hutchinson, Hardy[1] declared that he had seen cancer develop frequently enough in those affected with psoriasis to believe in a certain connection between the two maladies, and he quoted Bazin as holding the same opinion. Nielsen, on the other hand, although he saw a cancer of the breast develop in one of his cases, found the two affections so rarely associated in his experience that he could trace no connection between them.[2]

So long ago as 1851, Romberg[3] described an affection of the palms and soles characterized by epidermic desquamation, due to the internal use of arsenic. At a later period, Erasmus Wilson[4] called attention to the fact that not only desquamation of the palms and soles might be produced in this way, but also thickening of the epidermis and the formation of small "corns," the latter being seated at the mouths of the sweat-ducts. Within recent years a considerable number of cases of palmar keratosis due to arsenic have been reported by trustworthy observers, such as Hutchinson, Colcott Fox, Crocker, Malcolm Morris, Pringle, Hardaway and others. In these cases the arsenic had been taken for such a variety of dissimilar affections, such as acne, pemphigus, lichen planus, laryngitis, epilepsy, sarcoma, psoriasis, that the keratosis could in no way be regarded as the consequence of the disease; or it had been introduced into the system accidentally, producing, besides the keratosis, other symptoms of arsenical poisoning. In the greater number there were shot- to pea-sized firm elevations resembling the ordinary corn. Now, it is a very suggestive fact, that in eight out of the eleven cases of psoriasis followed by epithelioma some form of keratosis preceded for a greater or less period the appearance of the cancerous lesion, and in seven this keratosis was of the palmar and plantar variety, such as is found in the majority of cases due to arsenic. Certainly, this fact lends strong support to the view that the carcinoma may also be of arsenical origin.

In discussing the report of Lane's case, referred to above, Mr. Hulke, the then President of the Clinical Society of London, remarked that he had made inquiries among the workers in the mines of Cornwall, who are exposed to the inhalation of arsenic vapors, as to the occurrence of such growths among them, but he had not been able to learn of any; and Mr. Butlin,[5] who at another time had made a somewhat similar inquiry among smelters exposed to arsenic fumes, did not find that such workers were especially liable to carcinoma, particularly of the scrotum, as had been asserted. But this negative evidence is, in my opinion, more than offset by the statement recently made by Geyer, in the paper already referred to, that among the inhabitants of Reichenstein, a small town in Prussia, where arsenic mining is carried on, carcinoma, having its beginning in "arsenic warts" on the fingers, is frequently observed. And it is especially significant, that beside other evidences of arsenic-poisoning, such as melanosis and cachexia, diffused and circumscribed keratosis of the palms occurs in these cases, six such being referred to in a communication made to Geyer by physicians resident in the place.

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[1] Traité des Maladies de la Peau.

[2] Selected Monographs on Dermatology, New Sydenham Society.

[3] Klinische Wahrnehmungen und Beobachtungen.

[4] Lectures on Dermatology, 1873.

[5] Three Lectures on Cancer of the Scrotum in Chimney-sweepers and Others. British Medical Journal, 1892.

Conclusions drawn from so small a number of cases cannot be considered as final, but the evidence thus far in our possession is, I think, of such a character as to permit us to accept as very probable, at least, the arsenical origin of the epithelioma in these cases.

In concluding, I wish particularly to call attention to the very great importance of this subject in connection with recent theories concerning the pathogenesis of carcinoma in general. If it can be shown that the internal administration of arsenic is capable of producing carcinoma, we must either abandon all theories as to the parasitic origin of this grave malady, or we must assume the multiple character of the agents capable of producing it.

A CASE OF CYSTIC DEGENERATION OF THE KIDNEYS, WITH GENERAL DERMATITIS EXFOLIATIVA.

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The combination of these two rare affections is perhaps unique, though the presence of generalized skin troubles in kidney disease is not altogether uncommon, and leads to a serious prognosis. Dr. Samuel West and others have noticed that such eruptions, especially when they are of an acute type, if they are accompanied with albuminuria or evidences of granular kidney, generally end fatally. It has been disputed whether these rashes are uræmic in origin, or due to the retention of some irritant without the presence of uræmia, or whether they are accidental. There are rashes peculiar to kidney disease, but a generalized dermatitis may, of course, occur during perfect health. Indeed, Hebra's pityriasis rubra, which the present case was not unlike in appearance, is a peculiarly lasting and sometimes a congenital affection unconnected with any known disease. Certainly, cystic kidneys exist for years without definite symptoms, and skin affections are very rarely noticed with them.

T. W., aged forty-three years, a carter, came to the hospital as an out-patient in July, 1898, complaining of cough and dyspepsia. He was a stoutly built man; a teetotaller; had always been of a sallow complexion, and never perspired freely. A year before he had suffered from influenza, and in December he began to feel weak. In February he had a violent attack of lumbar pain, and in April he was noticed to be drowsy, and to be passing water at night more often than he had done before. His wife remarked that his scalp became full of dandruff, and in July a dry scaly eruption attacked a patch of skin on his back and itched a good deal.

I noted on first seeing him that he was anæmic, and that the urine was pale and showed a slight cloud of albumin. No high tension of the pulse was detected, though the aortic second sound was accentuated. The area of cardiac dulness was not enlarged and there were no murmurs. Nothing abnormal was found in the lungs.

Shortly after this he found that the scaly eruption became universal, and that his feet and a little later his whole body became swollen. On July 26th he proposed going to the seaside, but I persuaded him to come at once to the hospital, on account of his condition. There was at that time considerable diffuse œdema of the face and every part of the body; the stiff, thickened fingers were especially remarkable, while the skin was peeling off everywhere in dry, branny scales, leaving here and there a red denuded surface without any weeping. The urine was found to be normal in quantity; sp. gr. 1010 to 1017, acid, and showing a trace of albumin. He was kept in bed on a light diet, with milk and fish. The temperature was normal, and the urine remained throughout at thirty-six to fifty-three ounces daily, the bowels being regular. The skin improved rapidly, the œdema and albumin disappeared, and he expressed himself as quite comfortable, except for a slight cough. Suddenly, on the morning of August 6th, he sank into a comatose condition, for which he was actively treated by purgation, venesection, cupping, and pilocarpine without avail; death took place in a few hours.

Post-mortem (notes by Mr. F. P. Mackie). Upon examination forty hours after death the body is found well nourished, œdematous, and showing slight rigor mortis. The skin over the hands and feet is still peeling off, but otherwise normal The lungs overlie the heart and are emphysematous at the edges They are heavy and retain their shape. The lower lobes of both are œdematous, and there are evidences of bronchitis, with pus in the smaller bronchi. The upper lobes are normal. The heart shows post-mortem staining and commencing decomposition of the muscle, which is pale and flabby. The mitral valve admits four fingers, the tricuspid five, the aortic and pulmonary valves are competent, and all the valves healthy. The spleen and pancreas are normal, while the liver is pale, soft, and somewhat fatty, but shows no other change. The kidneys present well-marked cystic degeneration, and measure about seven inches by four inches.

The cysts vary in size up to that of a walnut, some filled with a clear gelatinous, and some with a reddish-brown, grumous material. The lining membrane of each cyst is well marked. There are no hemorrhages in the surrounding tissues and no trace of normal kidney substance. The ureters show nothing unusual. In the brain the only noticeable changes are a thickening and opacity of the pia mater and arachnoid over the left parietal and frontal regions, and some cystic change in the choroid plexus.

There are one or two points of interest in the case. First, it seems doubtful whether the œdema was due to the kidney disease or merely an inflltration of the skin. It disappeared without any increase of the urinary secretion as the dermatitis faded, and was somewhat firmer in consistence than the passive form is. The eruption was clearly one of the secondary types of pityriasis following upon the patch of eczema on the back and the seborrhœa of the scalp. Such attacks may follow various skin affections, as psoriasis, eczema, and lichen planus. They have been noticed after the use of various drugs, and Hutchinson records several cases in which intolerable itching in the back, as in this patient, was an early symptom. In a recent discussion of the subject at the Dermatological Society of Great Britain and Ireland, Walter G. Smith argued that the condition is not due to a specific disease but to a marked tendency in some persons to a spreading "catarrhal" inflammation set in motion by various causes. Whatever the primary affection, we usually find a sudden onset, the whole of the skin involved, redness, and copious continued desquamation. Rheumatism, vasomotor changes, neuroses, and unknown microbes have all been invoked as causes, but nothing certain is known. Some of those who took part in the discussion referred to the grave prognosis which the presence of the albumin during such an attack leads to. Whether the primary cases, such as Hebra described, and the congenital ones, occasionally met with, differ from the secondary ones in any important point is not clear, but in appearance there is little to distinguish them. Le Cronier Lancaster has reported eight cases occurring in uræmia which commenced as erythematous or papular patches on the extensor surfaces of the limbs, and quickly became universal, either subsiding with marked desquamation or becoming eczematous or pustular. Seven of the eight patients died in a few weeks.[1]

No cysts were found in the liver or elsewhere except the kidneys, where they formed two huge masses, which we failed to detect during life, probably from the amount of œdema present. The contents of the cysts showed quantities of leucin crystals and blood-corpuscles. Indeed, I believe the chocolate-like material in some cysts was chiefly altered blood.

Now, cysts may occur in perfectly healthy kidneys from retention, and are then generally few in number and small in size. The obstruction of a calculus may also produce a form of cystic degeneration when the kidney is at times reduced to a mere shell surrounding a single cavity. Again, in ordinary cases of interstitial nephritis, it is not uncommon to meet with a number of small cysts, or occasionally a large single one, situated chiefly in the cortex formed from dilated glomeruli; and, lastly, a very rare affection has been noted by Bland Sutton, Edmunds and others, where a group of cysts form a kind of wedge, surrounded by a capsule, and situated in the midst of healthy tissue.

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[1] Lancet, 1891, vol. ii. p. 1169.

The true cystic degeneration of the kidneys is different in character from each of these, and results in a great mass composed of cysts which vary in size from a hemp-seed to a walnut. Two forms have been described, one of which is congenital, and often accompanied with other malformations. The other is found in adult life.

In my specimens there is no distinction between cortex and medulla to be made out with the naked eye, nor any normal tissue, but the entire mass is much larger than the original organ. The most remarkable thing about the adult form of the disease, perhaps, is that life can be prolonged indefinitely with such degenerated organs. Patients may remain for years in good health with these huge collections of cysts replacing both kidneys, though probably any extra strain on the system, such as dermatitis, which happened in this case, would suffice to destory life. The symptoms they give rise to are few and often unobserved, so that death may take place from other causes before the disease is discovered. Ritchie[1] gives an analysis of eighty-eight cases which he collected. Taking seventy-five in which details were recorded, we find that the average age at which death occurred was forty-five years. Males were rather more numerous than females. Symptoms had been observed in some of them for as long a period as twenty-two years before death. Seven cases were only discovered post-mortem.

Nearly half the patients showed some albuminuria, though often it was very slight. The urine was generally copious, pale, and of low specific gravity. In some cases lumbar pain and hæmaturia had been occasionally noticed, and a few suffered from dyspnœa and œdema. The most common ending (about half the cases) was by coma, or what was called uræmia; others died from chest complaints, and a few from cerebral hemorrhage. A hypertrophied heart was noticed in less than half the number, while in others it was normal or dilated. It is worth remarking, that the ureters are always pervious, and, on the other hand, not dilated, as we see them in hydronephrosis. About a third showed accompanying cystic disease of the liver and other organs. Thus beside the occasional attacks of lumbar pain and hæmaturia, there is little to draw attention to the marked changes which have taken place if the enlarged kidneys are not discovered by palpation.

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[1] The Laboratory Reports of the Royal College of Physicians, Edinburgh, vol. iv. p. 194.

When we ask how the condition is brought about, we find that some half-dozen opposing explanations have been given: 1. It has been referred to persistent embryonic remnants. Shattuck and Bland Sutton think that a combination of the Wolffian body and true kidney has taken place, and that the cysts originate in portions of the Wolffian body. But Ritchie argues that not only have no nests of undeveloped cells been found, but that in the existing cysts we sometimes see renal tubules actually included as processes inside them. Again, if this view were correct, the origin of the congenital and adult forms would probably be the same, only that in the latter the surviving remnant must have suddenly started into activity late in life; for it seems impossible that these adult patients should have grown up vigorous and strong, and lived forty-five years with an organ crippled like this from birth. The average age at death would be much lower than it is if that were the case. Patients suffering from congenital heart disease rarely reach adult life. But there are strong reasons against a common origin. We do not find in adult cases other failures of development, such as cleft palate, club-foot, and, still more, an absence or malformation of ureters or pelves, which are so common in congenital cases. Cystic disease in the liver, lungs, and other organs is present in nearly one-third of the adult cases, but, curiously enough, it is almost unknown in the congenital affection. Four cases have, indeed, been recorded by Shattock, Still, and Pye-Smith, but none, so far as I know, by other writers, numerous as these congenital kidneys probably are. It is not clear how Shattock's theory can be stretched to explain cystic disease in the liver and other organs. We may notice here that the congenital disease has been also referred to fœtal nephritis, or some other form of inflammation, as well as to atresia of the canaliculi, or to their obstruction by uric acid or a colloid material. G. F. Still, in the report of his combined case,[1] insisted that there was no evidence of inflammation, and referred the lesion to developmental failure.

2. Another theory of cystic disease in the adult suggests that it is caused by obstruction. This may be brought about by colloid, epithelial, or other material in the tubules forming solid plugs, or by external compressions through interstitial fibrosis. The structure would thus be composed of a mass of retention cysts formed out of dilated tubules and glomeruli. In ordinary interstitial nephritis, as I have said, cysts are not uncommon, occurring in 20 per cent., according to Forbes; but they are generally small, and are to be found chiefly on the surface of the organ, or in the zone of limitation; and it has been claimed by some

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[1] The Lancet, 1898, vol. i. p. 32.

observers that casts of colloid material are to be seen in the tubules, which are then irregularly distended and contracted above the block, so as to form a chain of minute cysts. Newman, whose authority has much weight, regards this as the mode of origin of adult cystic kidneys, but there is a good deal of evidence against it. The interior of the cysts in these huge kidneys is lined with well-developed epithelium, columnar, cubical, and flattened, sometimes piled up, and there are frequent diverticula and projections or buds formed of masses of young cells, and apparently active proliferation going on. This is hardly what we should expect in mere distension cysts. However, Forbes[1] insists that in the oldest cysts this epithelium is absent, but it would be necessary to show that this absence is not the result of the preparation or of decay in a few of the cysts. Forbes also remarks that in interstitial nephritis the changes begin and are most marked in the cortex, and if small cysts are present, it is just here that they are found; and in true cystic kidneys the change is most advanced in just that region. He refers to a case of his own, in which the cystic changes were well marked in the cortex and almost absent in the medulla. On the other hand, few of these kidneys show any difference in the amount of cystic change between cortex and medulla, and though some increase of connective tissue is found in the remains of normal kidney among the cysts, it has been pointed out that the distribution differs from that in granular kidney, and that it does not exist at all in some places. Bard and Lemoine even think that the proliferation is due to the irritation which the growth of the cysts causes, for there is often none near the dilated tubules, but most of it is around the small actively growing cysts. In the beautiful collection of these kidneys in the General Hospital, Bristol, there is one of a pair which was found in a man of only twenty years of age. It is recorded that the capsule stripped easily, and the parenchyma remaining among the cysts was normal—in short, there was no evidence of interstitial nephritis. Though there are a large number of small cysts on the surface of the kidney, the number in the cortex and the medulla, as seen in a vertical section, is the same. Ritchie, too, finds no difference in the number of cysts in the two regions, and remarks that in cases in which he at first failed to find an epithelial lining in the larger cysts an improved method showed its presence in all. Thus he thinks the essential change is an irritative lesion, which produces great proliferation of the epithelium of the existing tubules and Malpighian bodies and the formation of actively growing cysts, sometimes with the development of blind or imperfect tubules, combined with or followed by connective tissue changes in the neighborhood. Forbes, on the other hand, thinks that adult cystic kidneys and granular kidneys containing cysts are due to one and the same cause, but that the former is a more advanced stage of the process.

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[1] Reports of St. Bartholomew's Hospital, 1897, vol. xxxiii. p. 181.

Apart from the changes in the kidneys themselves, is there any clinical evidence that interstitial nephritis is the cause? In Ritchie's series of cases we find that some thirteen were under forty years of age at death, but up to this age granular kidney is certainly uncommon.

Again, he gives twenty-nine out of seventy-two cases as showing cardiac hypertrophy, or 41 per cent., while Forbes estimates this at 34 and Lejars at 25 per cent., but some of these cases are included in Ritchie's list. Still, the highest figure is considerably short of what we should expect in granular kidney. It may be said that there is great difficulty in diagnosing the latter disease during life, and the copious pale dilute urine with a trace of albumin is a common symptom of it. Now, it is certainly strange, that with a fraction only of the kidney substance left patients can go on in fair health secreting this quantity of urine; but in Rose Bradford's experimental excision of part of the kidneys in animals we get a similar result. If less than two-thirds of the entire kidneys were removed the animal remained in good health and the amount of water excreted was greatly increased, but there was no albuminuria or change in total amount of urea excreted, unless the total of the tissue removed exceeded two-thirds. In other words, as the urea excreting cells are diminished the work is done by forcing a greater quantity of water through the remaining healthy ones, and the total of urea is thus kept up. Therefore, we may say that the copious dilute urine in cystic disease is merely compensatory, and that the difficulty of driving it through the remaining gland tissue leads of itself to such cardiac hypertrophy as we find in some cases. The albuminuria is not necessarily a sign of anything more than the injury done to the cells by the growth, or sometimes of the hemorrhages which often occur in the new-formed tissue. It should, however, be noticed that Forbes finds a great decrease of the total urea in some cases, but how often this occurs does not appear nor how long before the final breakdown.

Finally, the frequent termination by coma, it must be confessed, is against a simple destruction of the secreting area, as we do not find it in suppression from shock or after total excision, and an inflammatory process does undoubtedly take place, as shown by the interstitial proliferation around the small actively growing cysts, though there is much reason for thinking this is not that of granular kidney.

In our present case we saw that there was little or nothing in favor of granular kidney. While the patient was in the hospital he passed from thirty-six to fifty-three ounces daily, with a gravity of 1010 to 1017, and a trace of albumin, which, together with the final coma, might be caused by intoxication from the dermatitis; moreover, neither the heart nor the pulse were those of old-standing nephritis.

· Of course, interstitial nephritis and cystic kidneys may accidentally occur in the same patient, especially in persons over forty, but the evidence of a causal relation is defective. In the other forms of kidney disease, parenchymatous or lardaceous, we have even less reason to look for such a connection. There is one instance recorded where the latter was a complication, but there is, perhaps, nothing to support the supposition that epithelial casts ever cause these cysts by plugging the tubules. Clinical evidence is entirely against the view of their origin in parenchymatous nephritis.

3. The other theory to be considered is that these cases are related to the adenomata. N. Senn, in opposing this view, seems to assert that the epithelial lining of the cysts is different from that of the normal kidney, but Bland Sutton points out that the approximation to the normal gland tissue is after all considerable, though the new growth is unable to take on the functions of the old. The columnar, cubical, and squamous epithelium, with its bud-like processes and active proliferation, and the blind tubules sometimes seen in the cysts appear to bear out this assertion. We may, perhaps, regard as a more advanced type those nodular growths and encapsulated collections of cysts to which Kelynack and others would restrict the name of adenomata. The capsulation and the masses of epithelial cells invading here and there the interstitial tissue have not been demonstrated in cystic kidneys, but the alveolar structure and epithelial overgrowth may be conceded. As Prof. Coats remarks, the cysts are obviouly growing structures of well-formed tissue, and the condition probably arises from a perverted function of the renal epithelium. Ritchie's elaborate drawings show not mere retention cysts folded in here and there by external pressure, but masses of new epithelial growth directed inward from the walls of the cysts or alveoli.

However, the distinction between degeneration by the formation of endless retention cysts, on the one hand, and true hyperplasia and adenomatous growths in a complex gland like the kidney is one upon which diversity of opinion is likely, but another point must be referred to. In about a third of the cases we find the presence of masses of cysts in other organs, and it has been rightly said that no explanation is satisfactory which does not account for this complication. The brain, the thyroid, the pancreas, the uterus, and, above all, the liver have been thus affected. In one of the Bristol cases they were found also in the lungs. Kanthack and Rolleston seem to regard the process in the liver as an inflammatory one akin to that in cirrhosis, but it is followed by an epithelial change. New bile capillaries are formed from islands of existing liver tissue and undergo an alveolar transformation. It seems impossible to apply any of the retention theories to the cysts in all these organs, but whatever is the true process, we are totally in the dark as to the nature of the poison which originates the changes.

PURULENT ENCEPHALITIS AND CEREBRAL ABSCESS IN THE NEW-BORN DUE TO INFECTION THROUGH THE UMBILICUS.[1]

BY GUY HINSDALE, M.D.,
OF PHILADELPHIA.

THE brain which I have to show was removed from the body of a child, aged thirteen days, by Dr. J. T. Stanford, of Philadelphia, to whom I am indebted for the following history:

The mother of the child was a colored woman, aged about twenty-seven years, who had had uterine trouble, for which she was treated in the Presbyterian Hospital, Philadelphia, two years ago. She had a miscarriage and subsequent inflammatory trouble, for which her uterus was curetted.

During the early part of her pregnancy she complained greatly of pains in the right iliac region, and external applications were made, with very little relief. She was confined to bed and had some fever. In confinement she was attended by a midwife. After a labor of forty hours' duration she was delivered of a male child weighing twelve pounds. The midwife reported that during and after the expulsion of the placenta a large quantity of pus came from the womb. The child was fed from a spoon, and emaciation became marked after the third day. There was nystagmus from its birth, and he uttered short, shrill, frequent cries; there was continuous retraction of the neck. Dr. Stanford first saw the child four days after birth, and found the temperature 103° F. There were convulsions, but no paralysis; there seemed to be chills, and the mouth had the appearance of thrush. The umbilical cord had a fetid odor. It was then dressed with boric acid, and separated on the sixth day. The child continued to grow worse; he would not nurse, seemed to be in great pain, and died on the thirteenth day.

Autopsy nine hours after death; permission to examine the head only. The skull showed a deficiency at the frontal suture of about one centimetre; otherwise normal. There was no pus between the bone and the dura, but below the pia and generally over all surfaces of the brain was pus reaching down into the sulci. The pus was of a pale yellow hue and quite thick. In the left frontal lobe was an abscess containing about fifteen or twenty c.c. of pus. The cavity was evidently of recent formation and had no limiting wall. In a corresponding position on the opposite side was a large hemorrhage, and all through the cortex were minute hemorrhages. The cerebellum also showed purulent encephalitis. Bacteriological tests were undertaken by Dr. S. S. Kneass, of the Pepper Laboratory of Clinical Medicine. The brain was placed in 50 per cent. formalin solution, and was hardened and examined microscopically by Dr. Joseph Sailer, of the Pepper Laboratory, to whom I am indebted. He made the following report:

Sections through regions of the cortex, where there are macroscopical evidences of inflammation, show slight round-cell infiltration into the subarachnoid space and into the tissue of the pia. These round cells extend also into the tissue of the cortex, which appears in this region to contain fewer nuclei than are normal. In the reflections of the pia between the convolutions the round-cell infiltration is very extensive. All the bloodvessels in the soft membranes are enormously distended, and their walls are infiltrated with granules of hæmosiderin. The lymphatic spaces are distended, their walls forming delicate trabeculæ between the areas of cellular infiltration. No hemorrhages into the arachnoid and pia can be detected. In the cortex the vessels are greatly distended, and there are enormous hemorrhagic areas, causing destruction of the infiltrated nervous tissue, which is filled more or less with crystals of hæmosiderin. The bloodvessels in all parts are distended, and surrounded by a thin layer of round cells. The perivascular cellular infiltration is less distinct in the parts more distant from the cortex. The neuroglia tissue appears to be more reticular than is normal, excepting the extreme outer layer of the cortex, which appears pale, stains badly, and is granular or homogeneous. In this degenerated tissue practically all the vessels are surrounded by extravasations of blood, and there are a few minute accumulations of round cells. The cellular exudate is made up in part of mononuclear cells, with somewhat irregular vesicular pale nuclei, but also contains vast numbers of polynuclear cells and leucocytes, characterized by the intensity by which the nuclei take the stain. In addition, there are a few cells with pale, elongated nuclei. Numerous bacteria are found mixed with the exudate, usually rod-shaped and slightly curved. The nerve cells of the cortex are somewhat swollen. Their nuclei are often irregular, and their protoplasm

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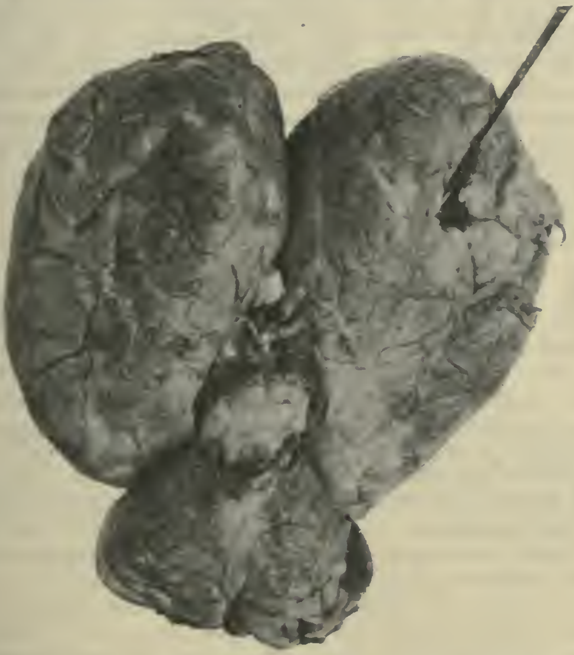
[1] Read before the American Neurological Association, at the twenty-fifth annual meeting, at Atlantic City, June 15, 1899.



takes the stain poorly. In some cases they are distinctly and extremely vacuolated, the vacuoles being much larger than the rest of the cell. The neuroglia nuclei take the stain intensely. They are somewhat irregular in outline, but show otherwise no abnormality. In a section taken from a hemorrhagic area in the interior portion of the right frontal lobe there is considerable infiltration of the subarachnoid space by round cells and some degenerative changes in the adjacent cortex, extending rather further from the pia. In certain areas the round cells appear to have broken into the cerebral tissue, forming aggregations of considerable size. In addition to the more diffuse infiltration, the lymphatic vessels are surrounded and filled with dense masses of these cells, and there are considerable accumulations in the perivascular spaces. The tissue is everywhere infiltrated by a diffuse hemorrhage that in many cases has broken down with the formation of hæmosiderin granules. The cellular infiltration of the folds of the pia dipping into the convolution is enormous. There appears to be an excess of the neuroglia granules. The nerve cells show changes similar to but more severe than those seen in the other specimen. In sections stained by Rosin's mixture hemorrhagic extravasation into the tissue is seen to be very extensive. In some of the bloodvessels partially organized thrombi can be seen. In all situations in the cerebral tissue when round cell infiltration has occurred, bacteria can be found.

The cultures taken by Dr. Sailer from the meninges gave the following results: There resulted a pure culture of a bacillus, measuring from $\frac{1}{2}\mu$ in length, and from 0.5 to 0.8μ in thickness, with rounded ends and without motility. It stains well with the aniline dyes, but is decolorized by treatment by Gram's method. It grows well on all media, producing a white to yellowish white moist opaque or somewhat translucent layer, with irregular but sharply marked edges on agar, solidified blood-serum, and gelatin. There is no liquefaction of the latter medium. Potato develops a spreading, moist, dirty white to yellowish growth, which becomes somewhat brownish in tint in old cultures. Bouillon and Dunham's solution become cloudy, with a granular deposit, and in some cases a slight mycoderm. In the latter medium there is production of indol. Litmus milk shows an acid production with coagulation of the casein and reduction of the litmus. In sugar media there is marked gas production, more in saccharose, maltose, and lactose than in glucose. The organism is quite pathogenic; guinea-pigs inoculated subcutaneously with 1 c.c. of a twenty four-hour old bouillon culture succumbing in twelve hours or even less. Its description corresponds to that of the colon group, and it is probably that known as the bacillus coli immobilis.

The only case of abscess of the brain of which I have knowledge, causing death at an earlier stage in life than in the present instance, is one published by Ribbert,[1] in 1879.

In this case the mother had puerperal fever. The child's epigastrium about the navel was infiltrated, but there were no abscesses. The thoracic and abdominal viscera were without noteworthy changes. Both tonsils and the walls of the pharynx, as well as the larynx and vocal cords, were covered with grayish-white masses, so as nearly to obstruct the passages. Microscopic examination showed oidium albicans or thrush fungus. Section of the brain showed that both hemispheres were filled with minute abscesses about a pin's-head in size. Microscopically, numerous granule cells, white corpuscles, and broken-down tissue. The abscesses were due to embolism.

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[1] Berliner klin. Woch., 1879, No. 11, s. 617.

Dr. L. Emmett Holt reported to the American Pediatric Society, in 1897, five cases of abscesses of the brain in infants, and has collected twenty-seven cases in infants and very young children. His cases occurred at the following ages: Six weeks, three months, five months, nine months, and three weeks. His collected cases varied in age from seven weeks to four years. The bacteriological examinations showed the streptococcus, staphylococcus pyogenes, diplococcus, pneumococcus, and, in one case, a child of three moths, the bacillus coli communis. An organism resembling the meningococcus was found in one case. Oidium albicans is also a cause of purulent meningitis in infants, and it is not surprising that abrasions about the mouth, so frequently the seat of fermenting detritus, should open a pathway for infection. That the colon bacillus should be found in the brain is noteworthy. Dr. L. N. Boston found it in J. H. Lloyd's case, an adult who died on the fourth day of purulent meningitis. Councilman, Mallory, and Wright have found it, but considered it a contaminating organism. Their investigations show that the diplococcus intercellularis is responsible for epidemic cerebro-spinal meningitis in children.

In the case which I present the infection was evidently through the umbilicus, and the lesions of the brain were apparently consistent with a short duration, probably not longer than elapsed between the birth and death of the child. It should be added that the mother made an uneventful recovery.

CONGENITAL IDIOPATHIC DILATATION OF THE COLON.[1]

By J. P. Crozer Griffith, M.D.,
CLINICAL PROFESSOR OF DISEASES OF CHILDREN IN THE UNIVERSITY OF PENNSYLVANIA.

Dilatation of the colon may be produced by a variety of causes, and various subdivisions based on etiology have consequently been made by writers. The form most frequently seen is that occurring generally in adult life, the result of habitual constipation. In some instances obstinate fecal impaction has developed, followed by death. In certain cases the obstruction has been brought about by the constipation producing kinking of the bowel through the weight of the contained feces. In others there has developed narrowing of some part of the bowel through external pressure. In the case of a boy of five years, reported by Gee,[1] a cyst compressed the anus. Sometimes the constipation and dilatation appear to be the direct result of an acquired atony, itself depending upon a debilitated system, perhaps the result of some acute exhausting disease. This may occur even in children, as in a case of Gay's,[2] in which great sluggishness of the bowels, with abdominal distention, developed in a boy of seven years who had just recovered from typhus fever.

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[1] Read before the Association of American Physicians, May, 1899.

All dilatations of the types mentioned may be properly designated "acquired." In another class of cases dilatation is the result of some congenital stenosis or obstruction in the colon or rectum, which immediately or slowly causes distention to develop above it. Treves[3] reports such a case, and takes the ground that probably all cases of dilatation of the colon in young children are of this nature. But this view is not supported by the evidence of the numerous post-mortem examinations.

A third class of cases may be called congenital idiopathic dilatation of the colon, and to this class our present study is especially directed.

The term "idiopathic" is employed here, as often, in a necessarily broad and rather loose manner. I would use it to designate an innate tendency to dilatation which is not dependent upon discoverable organic cause. The form of dilatation to which the term applies is not due to stricture or occlusion of any kind. It is not caused by constipation, as in acquired cases, but is itself the cause of this symptom, since the presence of fecal impaction or of scybalous masses is not the rule in this disease. It is not the result of a shortened mesocolon or other discoverable organic condition producing kinking. Although the great length of the sigmoid flexure in infancy probably predisposes to the development of the dilatation, yet this is in itself not the cause in idiopathic cases, else we should find the disease much more frequent than it is. Besides, in nearly all cases it is not the sigmoid flexure alone which is distended. The dilatation is not due to paralysis and atony alone, since so many cases develop in apparently healthy children, and so many autopsies show, in fact, hypertrophy of the intestinal walls. It cannot be said, on the other hand, to be due to congenital over-development of the walls of the colon, causing rigidity, since not every case has shown sufficiently marked hypertrophy, and, in any event, there is no proof that the hypertrophy is not a secondary development. It is not due to colitis, since statistics indicate that colitis is a terminal condition only. In fact, the term idiopathic expresses rather our state of ignorance, for there must naturally be some cause for the faulty tendency to dilatation in these cases. As to what this may be, however, we can do no more than theorize.

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[1] St. Bartholomew's Hospital Reports, 1884, xx. 20.

[2] Transactions of the Pathological Society of London, 1851, v. 174.

[3] Lancet, 1898, i. 276.

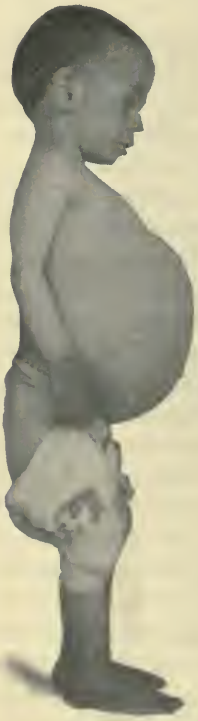
The term "congenital," too, requires comment, since it has been used by writers with different significations. I have employed it to designate not only an actual dilatation present at birth but also the existence of a congenital tendency to early dilatation, the latter condition being probably much the more common. With this definition in mind we can understand how some cases—those of the severest type—suffered distention and constipation, from earliest infancy, as soon as food began to enter the colon, and rapidly grew worse; others, with a less grade of the disease, resisted distention decidedly for a time or tolerated it well, although showing great lack of expulsive power always; and still others had periods of improvement, in which the distention largely disappeared, although the faulty nature of the colon remained, and relapse occurred later in nearly every instance.

It is impossible, however, to draw a sharp and always applicable line of distinction between congenital idiopathic cases and those which are not so. In the absence of an autopsy we cannot affirm positively that no stenosis existed, even though we may have reason to believe it. So, too, in cases in which the early history is incomplete or unsatisfactory, it is impossible to be sure that the symptoms were present from birth or soon after. Again, in cases in which the symptoms were clearly somewhat late in appearing we cannot always conclude with certainty whether the constipation present was a cause or a result of the dilatation. Consequently the cases selected as illustrations of idiopathic dilatation of the colon, and on which classifications have been based, differ with writers, and are not always the same, according as the writer's conception of the definitions of idiopathic and congenital differed. I have therefore studied the originals of all the published reports of cases as far as these are known to me, and, that those interested may judge for themselves, I have avoided the tabulation of symptoms or mere enumeration of cases, but have given abstract synopses of those cases which seemed to have any claim whatever to be regarded as congenital idiopathic dilatation of the colon. In a secondary list, not used here for purposes of study and analysis, I have mentioned briefly most of the other cases quoted in medical literature, but which, for reasons given with each, it would seem should be excluded from this category. It should be stated that although most of these cases have been called idiopathic, they are not commonly described as congenital.

Before giving the synopses I wish to relate the following history of a case once under my own observation:

Roy S., born June, 1894, and aged, at the time of examination, two years and eleven months. The family history was good. He had never been ill except for constipation, which he had more or less since birth, and for which very strong purgatives were required. When he was five months old marked distention of the abdomen began, with more or less pain nearly all the time. The child would sometimes go as long as a week before a movement could be obtained, but would then have diarrhœa for several days, with even increased gaseous distention of the abdomen. This condition persisted with little change until November, 1896, except for about a couple of months of each of his two summers, at which times the bowels would move naturally. In November, 1896, being then about two years and five months old, he was supposed to have swallowed a campaign button, and all purgative medicine was stopped for a week, after which it seemed well-nigh impossible to procure an evacuation, and the child had such pain and was so swollen that the parents "feared he would burst." Relief was obtained, at least to a degree, by the use of a rectal tube, which allowed the gas to escape; but the necessity of using the tube often daily, and of giving purgatives and enemata, persisted, and finally the procedures ceased to give much relief. He was brought to the hospital of the University of Pennsylvania, May 21, 1897.

FIG. 1.



The following notes are abstracted from the clinical history:

Condition on Admission. The patient is a well-nourished child, slightly pale, intelligent, and bright. The abdomen is enormously protruding, tympanic everywhere upon percussion, and measures 63.5 cm. (25 in.) at the umbilicus and 69.8 cm. (27½ in.) at the most prominent portion. (Fig. 1.) The umbilicus is pouting, and active peristaltic movements can be seen. The outline of the greatly enlarged colon is at times distinctly visible. No tumor can be felt anywhere. There is a large amount of veining over the trunk. The costal margin is very much everted by the pressure of the gas in the bowels. Ordered hot fomentations to relieve pain, the insertion at times of a rectal tube, enemata of soap and water, followed by some containing turpentine and sometimes asafœtida. Milk diet was given.

May 22d. The child retained the enemata for some hours, and finally passed a large bowel movement, which reduced the size of the abdomen a trifle.

23d. Strychnine ordered internally.

June 7th. The child has continued in much the same condition, and there has been vomiting on two or three occasions. A daily enema of milk of asafœtida has been given, and the milk diet continued, with, later, a little beef-juice added. Hot fomentations have been employed frequently, also high, laxative enemata, which relieved the distention slightly. There is not much pain, and the child is bright, but homesick. Yesterday morning he developed slight, watery, greenish diarrhœa. About 5 P.M. he grew irritable and had slight pain; the temperature rose by evening to 105.2° F.; pulse

140, respiration 37. Local antipyretic measures were ordered, with whiskey, digitalis, and quinine. The diarrhœa continued, and last night there were ten stools. The abdomen is tense, and the child has some pain. The temperature is less this morning and the abdomen is smaller, but it still measures 58.4 cm. (23 in.) at the most prominent part. Paregoric ordered.

9th. Fever has persisted. The abdomen now measures 68.6 cm. (27 in.) at the umbilicus and 72.4 cm. (28½ in.) at the most prominent portion. The diarrhœa is gradually lessening, but the child refuses nourishment and is losing ground. Enemata and strychnine stopped and bismuth ordered.

11th. As the condition grew worse through failing strength and continued great abdominal distention, operation was advised. Right inguinal colotomy was done by Dr. John Ashhurst, Jr., the colon being opened shortly beyond the cæcum. A large amount of semi-liquid feces and of gas came away through the opening after an injection into it, and the abdomen became much more relaxed.

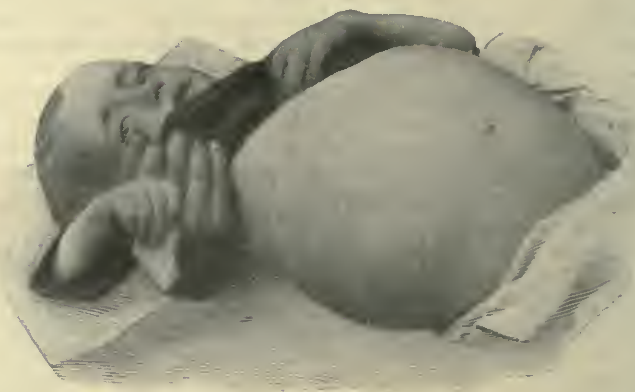
16th. During the rest of the eleventh and upon the following day a large amount of fecal matter was passed through the artificial anus, and the abdomen went down nearly to its natural size. The patient's general condition seemed at that time fairly good. The abdomen did not again become distended, but the child gradually failed in strength and died to-day.

The body was removed to the home of the parents and an autopsy performed there by Dr. R. J. Hillis, the physician who had sent the boy to the hospital. He reports that nothing was found abnormal in the belly except a marked constriction, about 25.4 cm. (10 in.) in length, situated in the ileum shortly above the cæcum. There was a small quantity of fecal matter above this. The ileum was not distended. There was no constriction found in the colon, and the abdomen was collapsed. No measurements of the colon were made, or any observation on the character of the intestinal walls.

I have seen a second case, which I believe to have been of the same nature as the one just described, although I do not include it as such, for want of a satisfactory clinical history. The child suffered from habitual obstinate constipation, and had an enormously distended, tympanitic abdomen. It was seen a number of years ago in the medical clinic of the University of Pennsylvania, and was made the subject of a lecture by Dr. William Pepper. I had a photograph of it taken on the day of its single visit to the hospital. (Fig. 2.) The presence of peritonitis was excluded, and the case was supposed to be one of extreme atony of the bowel. I now believe it to have been an idiopathic dilatation.

The following are the synopses of the cases which may with reason be considered congenital idiopathic dilatation of the colon. It will be noticed that the word "colon" has frequently been used by the writers to designate the large intestine, in contradistinction to the rectum and sigmoid flexure. In other instances it includes the sigmoid flexure as well as the rest of the colon. Each abstract shows what the writer has intended in this respect as far as he has made his meaning clear. The age given is in nearly every instance that of the patient when first coming under continued observation. The "history" details the condition up to this time, while the result of the examination and of the continued observation is described after the words "under observation."

FIG. 2.



Henoch. (*Beiträge zur Kinderheilkunde,* 1861, 123.) *History.* Boy, aged one and three-quarter years. Great distention of abdomen, with constipation on the third day after birth. Condition continued, constipation sometimes lasting eight days; tympanites; purgatives of little use; enemata better; passage of syringe nozzle best, this bringing away large amounts of gas and feces, always soft, with considerable lessening of girth. *Under observation.* No obstruction discoverable in rectum. Under continued medication grew much better; daily stools; abdomen much smaller. But symptoms returned after treatment stopped. Child lost sight of.

Peacock. (*Transactions of the Pathological Society of London*, 1872, xxiii. 104.) *History.* Man, aged twenty-eight years. Constipated from birth; purgatives, and, later, enemata always required. Worse after a severe attack at seventeen years. Flatulence annoying and abdominal distention often great. Obstruction set in six weeks before death; relieved, but returned; belly enormous; flatus passed in large quantities; died unexpectedly. *Autopsy.* Large intestine from cæcum to upper rectum enormously distended, 15 to 20 cm. (6 to 8 in.) in diameter, containing semi-solid feces; ulceration of mucous membrane. Ileum somewhat distended; rectum healthy.

Gee. (*St. Bartholomew's Hospital Reports,* 1884, xx. 19.) *Case I. History.* Boy, aged four and one-half years. At three months difficulty in defecation began, with hard stools. At twelve months swelling of abdomen began and constantly increased. *Under observation.* Great abdominal distention; coils of intestine visible; great dyspnœa; constipation, relieved by enemata; rectal tube brought away gas and gave some relief, the abdomen growing smaller. Lived a few weeks. Diarrhœa before death. *Autopsy.* Great elongation and enormous distention of sigmoid flexure; 10 cm. (4 in.) in greatest diameter; walls thickened. Sigmoid formed two huge sacs, connected by a narrow strip of bowel. Rectum distended; colon natural.

Case II. History. Boy, aged four years. Great distention since one month old; habitual constipation. *Under observation.* Extreme tympanitic distention; hard feces felt in rectum. Died soon after. *Autopsy.* Distention of colon, especially of upper part of sigmoid flexure. Contraction of rectum and of lower part of sigmoid below a hard concretion. Semi-liquid feces above this; no real stenosis.

There appears no evidence that the concretion caused obstruction and dilatation, and this is apparently Gee's opinion also.

Bristowe. (*British Medical Journal*, 1885, i. 1086.) *History*. Girl, aged eight years. "Long been subject to constipation of the bowels." No stool for fully seven weeks; latterly constant vomiting. *Under observation*. Distended abdomen, growing more so; no pain or tenderness; absolute constipation in spite of treatment; lived three weeks. *Autopsy*. Coils of distended intestine outlined through abdominal walls. After incision sigmoid flexure and descending and transverse colon found greatly distended, 7.6 to 9 cm. (3 to 3½ in.) in diameter. Ascending colon, cæcum, and small intestine also distended, but less so. Rectum distended to 5 cm. (2 in.) above anus. No stricture; thickening of muscular coat of large intestine; some ulceration of mucous membrane. Large intestine full of thick, semi-solid feces. Hardened mass above anus. No flatus.

Bristowe attributes the condition chiefly to the acute obstruction; yet the history of constipation for years, with the presence of marked hypertrophy of the walls of the colon, point strongly to a congenital origin.

Cheadle. (*Lancet*, 1886, ii. 1117.) *History*. Boy, aged three years. Tumidity of abdomen and obstinate constipation began at three months. All purgatives failed in turn; stools dry and hard; for two years almost never a stool without enema. Sometimes colon retained two or three enemata given in one day. *Under observation*. Abdomen greatly distended, especially in position of colon below ribs; girth 59 cm. (23¼ in.); tympanitic. Under treatment with mild laxatives and tonics improved, and recovery about complete, with daily stool, in two months.

Fütterer. (*Virchow's Archiv*, 1886, cvi. 555.) *History*. Boy, aged fourteen years. Abdomen distended from birth and grew larger slowly, but last year rapidly. Bowels moved about three times a day spontaneously. *Under observation*. Enormous abdomen, 91 cm. (35⅞ in.) in girth; tympanitic; no vomiting. Distention somewhat diminished by daily injection. Exploratory operation; nothing done; death. *Autopsy*. Sigmoid flexure distended into a huge sac; wall hypertrophied; no ulceration. Colon and rectum not distended. Passage from rectum into sac distorted, so that obstruction by pressure was produced.

Fütterer regards the case as an instance of true congenital malformation of the sigmoid flexure, which makes the propriety of including it in this list somewhat doubtful.

Hughes. (*Transactions of the Pathological Society of Philadelphia*, 1887, xiii. 40.) *History*. Boy, aged three years. Obstinate constipation in infancy; abdomen gradually grew larger and constipation worse; stools only after laxatives, but never hard. After entero-colitis at two years constipation more obstinate, and once lasted nineteen days. *Under observation*. Abdomen enormously enlarged; peristalsis of intestine visible; tympanites; no stool for twenty-four days. Improved; then severe diarrhœa and death. *Autopsy*. Colon and upper rectum greatly distended, especially latter and lower colon, which measured 10 cm. (4 in.) in diameter. Walls much thickened; ulceration in mucous membrane.

Hirschsprung. (*Jahrbuch für Kinderheilkunde*, 1888, xxvii. 1; *Pädiatrische Arbeiten; Henoch's Festschrift*, 1890, 78.) *Case I. History*. Boy, aged eight months. Constipated from birth; purgatives failed, and only repeated enemata produced evacuation. Constipated habit continued, and all sorts of remedies required to obtain evacuations, which were of normal color and consistence. Health good otherwise. Abdomen moderately distended; scybalæ felt in rectum; once only one stool in fourteen days. Lost health. *Under observation.* Never stool without aid; those obtained were of normal appearance. When constipated abdomen became enormously swollen, this disappearing for a brief time after opening bowels. Occasional vomiting; sound passed easily into rectum. Later unassisted movements, followed by great abdominal swelling, profuse diarrhœa, and death at eleven months. *Autopsy.* Great dilatation of sigmoid, and especially of transverse colon; wall thickened; ulcerations present. Rest of colon widened; rectum natural. No constrictions.

Case II. History. Boy, aged seven months. Constipated from birth; stool only by purgatives; no pain; no vomiting; abdomen at times greatly distended, and this gradually increased. At six months puncture with trocar. Then lost health; had diarrhœa and occasional vomiting. *Under observation.* Abdomen 56 cm. (22 in.) in circumference; peristalsis visible; profuse diarrhœa and wasting persisted until death in four or five weeks, and abdominal distention until shortly before. *Autopsy.* Great distention of sigmoid flexure and transverse colon; hypertrophy of walls; ulceration of mucous membrane.

Case III. History and observation. Boy, aged two and one-half months when he died. No stool from birth. Seen on third day, with much distended and tense abdomen. Passage of finger into rectum brought a stream of meconium out. Constipation continued, with never spontaneous stools; then more frequent stools with purgatives; then spontaneous stools; no actual diarrhœa. Abdomen always somewhat, and at times greatly, distended, with coils of intestine visible. Distention increased; health failed; no vomiting until day before death; never much pain. *Autopsy.* Distention of cæcum and ascending, transverse, and descending colon and sigmoid flexure. Hepatic and splenic flexures narrower. Walls of colon thickened; no ulceration; no strictures. Colon nearly empty.

Case IV. History. Boy, aged ten years. From the time he was little he had constipation, distended abdomen, occasionally abdominal pain, usually ending in expulsion of feces and gas, exceptionally vomiting. *Under observation.* Enormous distention of abdomen; tympanitic; not tender; feces in rectum; no stool for eight days. Continued treatment with enemata produced evacuations of bowels and diminution in size of abdomen, though girth still 63 to 67 cm. (24⅘ to 25⅖ in.). Had periods of spontaneous stools, not hard, sometimes thin. Six months later in fair health, but never a stool without enema.

Formad. (*University Medical Magazine*, 1892, iv. 625.) *History.* Man, aged twenty-nine years. Large abdomen and frequent constipation to one and one-half years of age. Then distention and constipation became worse. As he grew up constipation would sometimes last a month. Abdomen increased constantly in size; tympany. Later, pain, dyspnœa, weakness. At twenty years he became a museum freak ("balloon man"). Died suddenly on water-closet. *Autopsy.* Abdomen measured 220 cm. (86½ in.). Whole colon, especially transverse, distended with gas and semi-liquid feces, measuring 25 to 76 cm. (10 to 30 in.) in circumference; no thickening of walls; no kinking or other stricture; no impaction. Rectum and small intestine normal.

Hadden. (*International Clinics*, 1893, iv. 53.) *History.* Boy, aged eleven weeks. Bowels natural until three weeks old, when symptoms began (pain, vomiting, constipation, distention) and continued. *Under observation.* Abdomen greatly distended; peristalsis visible. Treated for three weeks, then stool obtained, but child died of exhaustion. *Autopsy.* Distention of last 61 cm. (24 in.) of small intestine and of colon up to sigmoid flexure. Mucous membrane ulcerated; no stricture.

Walker and Griffiths. (*British Medical Journal*, 1893, ii. 230.) *History.* Boy, aged eleven years. Distention of abdomen noted when a few weeks of age; increased rapidly, and by three years was enormous. Bowels acted regularly until three years; then always constipation, relieved by enemata. Always dyspnœa; little pain generally; latterly more. Occasionally passage of large amount of gas relieved the distention. Died suddenly while receiving enema. *Autopsy.* Girth of abdomen, 119 cm. (47 in.). Colon enormous, especially transverse and descending portion, 58 cm. (23 in.) in circumference; contained soft feces. Rectum, small intestine, and lower part of sigmoid normal. No constriction. Walls of colon much thickened; chronic inflammation of mucous membrane.

Osler. (*Archives of Pediatrics*, 1893, x. 111.) *History.* Boy, aged ten years. Always prominent abdomen; for years trouble with bowels. *Under observation.* Abdomen 63 cm. ($24\frac{4}{5}$ in.) in girth; tympanitic; not tender; some pain. Coils of intestine visible. Generally constipation, easily relieved; occasionally diarrhœa; some vomiting. Laparotomy showed "entire gut enlarged," especially the sigmoid flexure, which measured 45 cm. ($17\frac{3}{5}$ in.) in circumference. Walls much thickened; no stricture or impaction. Artificial anus made; fluid feces and gas escaped; distention entirely relieved. Recovery. No return of symptoms during several years; then lost sight of.

Mya. *Case I.* (*Lo Sperimentale*, 1894, xlviii. 215.) *History.* Girl, aged two and one-half months. Vomiting, distention of abdomen, and constipation began day after birth; stool only after repeated injections. Then tumefaction persisted, with constipation for eight days, and frequent vomiting. *Under observation.* Abdomen 45 cm. ($17\frac{3}{5}$ in.) in girth. Rectal tube passed readily. By enemata obtained passages with tolerable regularity. Seen again at eight and one-half months, with return of constipation. Abdomen 53 cm. ($20\frac{4}{5}$ in.). The emptying of lower bowel, especially of gas, produced partial diminution in girth, but vomiting not entirely arrested. Child lost sight of.

Case II. *History.* Boy, aged five and one-half months. Twenty-four hours after birth swelling of abdomen began and constantly increased. Stools only every four or five days with enemata. Twice no stool for eight days, then vomiting and finally diarrhœa. *Under observation.* Distended abdomen, girth 52 cm. ($20\frac{1}{2}$ in.); tympanitic. Sound removed quantities of gas, with some diminution in size. Later developed diarrhœa, with rapid diminution in girth. Died collapsed. *Autopsy.* Large intestine everywhere thickened. Mucous membrane ulcerated. Colon irregularly distended; transverse colon most dilated, measuring 16 cm. ($6\frac{3}{10}$ in.) in diameter.

Generisch. (*Jahrbuch. für Kinderheilkunde*, 1894, xxxvii. 91.) *History.* Girl, aged one and one-quarter years. No stool after birth. On second day abdominal distention began; increased greatly. First stool on eighth day of life, after purgatives, and abdomen then grew smaller. Later often long periods of constipation; occasionally vomiting. *Under observation.* Abdomen enormous, 59 cm. ($23\frac{1}{5}$ in.) in girth; tympanitic; outline of dilated colon visible; sound removed gas and lessened distention; a week before stool obtained. Later, spontaneous, soft stools, with some diminution in size of abdomen; then return of symptoms; finally diarrhœa, vomiting, and death after three months of observation. *Autopsy.* Colon much distended, 8 to 11 cm. (3 to $4\frac{3}{10}$ in.) in diameter; walls thickened; mucous membrane ulcerated. Transverse colon largest; sigmoid flexure partly distended, passing into a narrower portion. Bowel contained soft feces.

Rolleston and Haward. (*Transactions of the Clinical Society of London*, 1896, xxix. 201.) *History.* Boy, aged twelve years. Distention of abdomen began at two months. Was subject to gradually increasing constipation; often no stool for several days or even weeks, and then would be very ill and have much distended abdomen. Last two years often vomited. *Under observation.* Abdomen enormously distended; tympanitic; peristalsis visible. Obstinate constipation, with distention and abdominal distress, alternated with daily movements, with relaxation of abdomen. Hard feces in rectum at times. Watched three months. Died in one attack. *Autopsy.* Descending colon and sigmoid flexure greatly distended; rest of colon and first part of rectum less so; no stricture. Walls of colon hypertrophied; mucous membrane ulcerated.

Martin. (*Montreal Medical Journal*, 1897, xxv. 697.) *History.* Boy, aged three and one-half years. No stool until five days old. Later always constipated, sometimes going eleven days. Enlargement of abdomen began at one year, and steadily increased, with occasional lessenings following escape of flatus. Latterly slight pain. Stools scybalous; later semi-solid; two intermittent attacks of diarrhœa. *Under observation.* Great distention, girth 68 cm. ($26\frac{4}{5}$ in.). Coils of intestine and vermicular movements visible; tympanites; no tenderness; rectum normal on digital exploration. Exploratory operation done; no stricture found; wound closed. Second laparotomy two weeks later; intestines punctured by trocar; death in a few days. *Autopsy.* Perforative peritonitis. Sigmoid flexure elongated; enormously distended; 38 cm. ($14\frac{9}{10}$ in.) long, 5 to 8 cm. ($1\frac{9}{10}$ to $3\frac{1}{10}$ in.) in diameter; contained solid feces; walls thickened; no ulceration; partial narrowing of lower portion through possible thickening of mesocolon. Rectum normal. Descending colon somewhat dilated and much thickened.

The narrowing in this case does not appear to have amounted to a stenosis.

Hichens. (*Lancet*, 1898, ii. 1121.) *History.* Man, aged twenty years. Constipated "from the day of his birth until the day of his death." Abdomen always greatly distended; purgatives and enemata always needed; stools only every ten to fourteen days, and then scybalæ, followed by several loose movements. Sudden death. *Autopsy.* Abdomen enormous. Sigmoid flexure enormously distended and much elongated; 57 cm. ($22\frac{1}{2}$ in.) long, 35 cm. (14 in.) in smallest circumference; contains gas and semi-liquid feces. Walls much thickened; slight distention of colon; no stricture anywhere.

Hobbs and de Richemond. (*La Médecine Moderne*, 1898, ix. 652.) *History.* Girl, aged two and one-half years. Considerable enlargement of abdomen, giving rise to difficulty in extracting child at birth. After birth evacuation of bowels always difficult; vomiting for three months; abdomen continued to grow larger; purgatives and enemata of little effect. *Under observation.* Enormous abdomen; tympanitic. Sound entered rectum easily 25 cm. ($9\frac{4}{5}$ in.); brought away feces on its end. Puncture with small trocar allowed $3\frac{1}{2}$ litres of gas to escape, but abdomen soon filled again. Watched over a month. No improvement. Operation advised. Child disappeared.

Cases not to be included for reasons stated with each. Most of them mentioned in lists by other writers, who have not necessarily designated them as congenital.

Banks. (*Dublin Journal of Medical Science*, 1846, i. 235.) Man, aged fifty years. Had had some former attacks of same kind. This acute and fatal. No reason to consider case congenital.

Chapman. (*British Medical Journal*, 1878, i. 566.) Specimen only. Subject aged fifty-eight years. No history.

Money and Paget. (*Transactions of the Clinical Society of London*, 1888, xxi. 103.) Adult, aged fifty-five years. Clearly not a congenital case. Fatal.

Little and Callaway. (*Transactions of the Pathological Society of London*, 1851, iii. 106.) Adult, thirty-four years of age; imbecile; inordinate appetite. Died from acute constipation and over-distention of abdomen. Every reason to believe acquired.

Goodhart. (*Transactions of the Clinical Society of London*, 1881, xiv. 84.) Girl, aged seventeen years. Well until eight months before. Clearly secondary to anæmia.

Bristowe, second case. (*British Medical Journal*, 1885, i. 1086.) Man, aged twenty-four years. For "some long time" subject to constipation. No history of any congenital dilatation. Died of peritonitis.

Morris. (*British Medical Journal*, 1886, ii. 1211.) Woman, aged twenty-four years. Acute attack. Recovery. No reason to suppose congenital.

Wallmann. (*Virchow's Archiv*, xiv. 202) Man, aged sixty-six years. Several true diverticula. Not like congenital idiopathic dilatation as here understood.

Ammon. (*Angeborene chirurgische Krankheiten*, S. 39. Atlas.) Specimens from bodies of new-born or fœtus; some clearly with stenosis. No histories given, although pathologically some exhibit the characteristic lesions.

Vulpian. (*Gazette des Hôpitaux*, 1877, No. 75.) Case of dilatation, with narrow anus.

Lacave. (*Verhandl. van het Genootschap ter Bevord. der Genees en Heilkunde te Amsterdam II. Deel.* 1 *Stuck*, 1858, 7.) Clearly result of atresia ani.

Gruber. (*Virchow's Archiv*, 1872, lvi. 432.) Autopsy specimen. Probably acquired dilatation, with congenitally abnormal length.

Ebers. (*Hufeland's Journal*, August, 1836, lxxxiii. 62.) Male, aged seventeen years. Symptoms rather of acute obstruction, although always constipated habit; yet no history of distention. No reason to assume was congenital.

Wells. (*Transactions of the Society for Improvement of Medical and Surgical Knowledge*, 1812, iii. 158.) Man, aged fifty-eight years. Acute symptoms; no history of previous attacks.

Lewitt. (*Chicago Medical Journal*, 1867, xxiv. 359.) Man, aged twenty-one years. First attack at twelve years. No evidence that case was congenital.

Harrington. (*Chicago Medical Journal and Examiner*, 1878, xxxvi. 400.) Man, aged fifty-one years. Acute attacks; probably old dilatation; but no symptoms of congenital affection.

Herringham and Clarke. (*St. Bartholomew's Hospital Reports*, 1895, xxxi. 57.) First case. Man, aged seventy years. Dilatation probably old, but no proof that it was congenital. Second case. Child, aged four months. Began as colitis; dilatation appears to have been secondary to this.

De Haen. (*Ratio Medendi*, iv. Cap. iii.) Quoted by Gee. Chapter III. refers to cases of drowning. Reference clearly wrong. Chapter IV. has some cases involving dilatation of colon, but none to be placed in this category.

Parry. *Posthumous Works*, vol. ii. 380.) Man, died of constipation apparently. No history of a congenital origin.

Gay. (*Transactions of the Pathological Society of London*, 1854, v. 174.) Boy, aged seven years. Condition followed an attack of typhus; probably result of this, and therefore acquired.

Eisenhart. (*Centralblatt für die innere Medecin*, 1894, 1153.) Woman, aged fifty-three years. Appears to have been an acute abdominal dilatation resulting from chronic constipation; no history of early distention.

Strahan. (*Lancet*, 1893, ii. 1245.) Man, aged thirty-two years. Lunatic. No history of abdominal distention. No reason to regard colonic dilatation as congenital.

Lespinasse. (*Journal de Médecine de Bordeaux*, 1888–1889, xviii. 427.) Woman, aged seventy-eight years. Enormous distention of sigmoid. No evidence of congenital origin.

Favalli. (*Gazetta medica di Milano*, 1846, v. 213.) Man, aged fifty years. Acute case; no history of early distention.

Berti. (*La Pediatria*, 1894, iii. 136, 161.) First case. Seen by Porro. Congenital dilatation, but associated with imperforated anus. Second case. Child, aged thirteen months. Autopsy showed dilatation of sigmoid flexure, which may have been congenital, but symptoms entirely wanting. No constipation. No abdominal distention until last day of life. Third case. Boy, aged two months. Autopsy showed long sigmoid, with saccular dilatation of a portion of it. Appeared like a congenital malformation, but never any symptom during life. Died of marasmus.

Cheadle. (*Lancet*, 1886, ii. 1107.) Boy, aged five and one-half years. Constipated habit only for last nine months, then abdominal distention. Recovered entirely. Case apparently result of temporary atony. No reason to regard as congenital.

Osler. (*Archives of Pediatrics*, 1893, x. 111. Second Case.) Child of seven years. Supposed to be idiopathic, but autopsy two years later (personal communication from Dr. Osler) showed stenosis of sigmoid flexure.

The cases of Berti's are the only ones in this list which might with any reason be included in the first list; but as we are considering a clinical condition as well as an anatomical one it is better to exclude them from it.

A glance at the history of Roy S. and at the synopses of the published cases, a total of twenty-four in all, shows a very characteristic group of symptoms. Chief among them and first to appear are two—viz., constipation and abdominal distention. In twenty-two of the cases one or both of these was witnessed within three months, and nearly always within a few days after birth. In two cases (Bristowe's and Formad's) the time is not distinctly stated. Generally it is noticed that within a few days after birth the child tends to be much constipated. In some cases this has been complete and obstinate, and only relieved after repeated administration of purgatives or enemata. In other cases therapeutic means have been more promptly successful. In a few, as in the cases of Hadden, Rolleston and Haward, Cheadle, and in one of Gee's, several weeks or even as long as three months appear to have elapsed before the trouble with the bowels began. In Fütterer's patient there was never constipation. In nearly half the cases constipation was the first symptom noticed, although in most of these distention of the abdomen developed very soon after.

In almost all of the remaining cases the development of constipation and of distention seems to have been simultaneous. There are, however, some exceptions to this. Thus in a few cases abdominal distention was quite late in developing. For instance, in Martin's patient and in the first of Gee's there was no distention until the age of one year, although constipation began much before. In my patient distention was not noticed until the age of five months. In a very few cases the history seems to indicate that the development of abdominal distention has antedated that of constipation. The only certain instance of this, however, and the most marked, is that of Walker and Griffiths, in which distention was noted at a few weeks of age and constipation not until three years. The degree of distention has varied much according to the case, but always seems to have been very marked. Frequently its degree has depended to a considerable extent upon the degree of constipation. The relief of constipation by enemata or purgatives would in most instances be attended by a decided diminution in the size of the abdomen. On the other hand, in my own case attacks of diarrhœa seemed to produce little diminution in the abdominal girth. Often nothing has given such relief to the distention as the evacuation of gas through a rectal tube. The abdominal distention was always tympanitic. Frequently the outline of the distended colon could be perceived through the thinned abdominal walls, and peristaltic movements were visible.

Particularly in the cases which have survived the first year or two of life there has been a decided tendency to repeated attacks, or rather exacerbations. In these constipation, though always troublesome and constantly growing more so, became more extreme and the abdomen more distended. With rare exceptions it has been only in such attacks that pain or vomiting has been a prominent feature. As a rule, pain and tenderness have been slight or absent, and vomiting only occasional.

As to the character of the stools, it seems only exceptional that they have been scybalous. Henoch, for instance, calls attention to the fact that the insertion of a rectal tube in his patient always brought away feces which were soft. In one of Hirschsprung's cases there had been no stool since birth, yet the finger introduced into the rectum produced the discharge of a stream of meconium. These are examples only of the usual condition. At autopsy, too, the feces in the colon have been nearly always in a semi-liquid state. Hard, fecal masses have been the exception. In fact, everything points to an inability of the colon to propel its soft contents rather than to a blocking by hard masses.

Not infrequently there have been attacks of diarrhœa, and it is especially noteworthy that in a number of instances severe diarrhœa has been a terminal symptom.

The general health has always suffered sooner or later, although in a few instances not for a considerable time. Dyspnœa is liable to be produced by the pressure against the lungs.

It is interesting to note that twenty of the cases have been male and only four female.

The prognosis, while not totally bad, is most unfavorable. Eighteen of the twenty-four cases are known to have terminated fatally. Only three of these—those of Peacock, Formad, and Hichens—are known to have reached adult life. The remaining died in infancy and childhood—the oldest at the age of fourteen years, eleven of them before the age of five years, and six of these before that of three years. Only two patients—those of Cheadle and of Osler—can be said to have recovered, the latter consecutive to the formation of an artificial anus. When heard of some years later he was, I believe, doing well (personal communication from Dr. Osler). The four remaining non-fatal cases disappeared from observation—one of them somewhat improved, the other three not at all so.

Eighteen autopsies and one laparotomy on a case which recovered show a striking uniformity in the principal features of the pathological anatomy of the disease. In all there was dilatation of more or less of the large intestine, generally described as "enormous." There seems to be an erroneous opinion in some quarters that it is the sigmoid flexure which is chiefly or solely dilated in this disease. I wish to call particular attention to the fact that there are but two cases described—Fütterer's and one of Gee's—in which this appears to have been the only portion of the colon dilated; and but two others—Martin's and Hichens'—in which the remainder of the colon is said to have been but slightly involved. In all the remaining, with one exception, both sigmoid flexure and the rest of the colon were much dilated; sometimes the sigmoid flexure most (Gee, Osler); sometimes some other part of the colon most (Hirschsprung, first case; Formad, Mya, Generisch). In the one exception referred to, that of Hadden's case, the colon, without the sigmoid flexure, was involved. In a few cases the rectum was distended in a portion of its course. The small intestine was never distended to any considerable extent.

The degree of dilatation of the colon has been often enormous. It has sometimes appeared at autopsy to fill the whole abdominal cavity, crowding everything else out of sight. A very characteristic pathological feature has been the thickening of the walls of the colon. This has been reported in nearly every case. Only in Formad's is it stated to have been absent. In a few others it is not referred to (Peacock, Gee, second case). In my own case no observation was made regarding it. Generisch is disposed to regard the thickening as an early change, and as one of the causes of the loss of peristaltic power. It seems, however, just as likely—certainly in many cases—that it is a later change occurring in an effort at compensation. Ulceration of the mucous membrane is another alteration quite often seen. It is doubtless a later change and not a necessary one. It was nearly always found in cases in which severe diarrhœa had terminated life.

The diagnosis is easily deduced from the symptoms detailed. It rests upon the very early presence of troublesome constipation; the development with this, soon after, or rarely before, of great tympanitic abdominal distention; the discovery often of the distended colon outlined through the abdominal walls; the absence of evidence that the constipation is due to impaction; the absence of any discoverable organic obstructive cause, as shown by the exploration of the rectum and colon; the absence of any previous debilitated state of health which might occasion colonic atony; and, finally, the confirmation by an autopsy that no structural obstruction of the intestine was present. This last, although, of course, a "post-mortem diagnosis," is often indispensable. As pointed out at the opening of this article, it is sometimes impossible—as in many other diseases—to make an infallible diagnosis without autopsy. A sharp diagnostic line between idiopathic and obstructive congenital cases cannot always be drawn.

Treatment can only be (1) hygienic and medicinal and (2) operative. In the first class improvement of the general health is indicated, since this may help to increase the peristaltic power of the colon. Massage has been recommended by some, and condemned by others, on the ground that it may produce perforation of ulcerated spots. Carefully performed in cases without diarrhœa or tenderness, it seems indicated. Electricity may be used for the same purpose. Means must be employed to empty the bowels either by purgatives or enemata. Objections exist to the use of either, since eventually they tend to weaken still further the muscular power. In the case of Hughes the child seemed to be made distinctly worse by enemata. Yet it is often a case of "needs must," and that remedy has to be selected which best unloads the bowels and gives relief. The use of the rectal tube to remove gas has sometimes been a great comfort to the patient. In three instances — Martin's, Hobbs' and de Richemond's, and one of Hirschsprung's—puncture of the intestine with a fine trocar has been performed, in order to allow gas to escape.

In any severe case tending to grow worse seasonably early operation of some sort is to be advised. In spite of the gravity of the procedure, not to employ it seems still more grave. Exploratory laparotomy was performed on the patients of Fütterer and Martin, but nothing more radical was attempted. An artificial anus was made by Halsted in Osler's case, and the child recovered. The same operation was performed in my own case. Had it been done earlier, before the rapid failure of health set in, the chance of recovery would have been greater. The operation done by Treves (*loc cit.*) on a child with dilatation consecutive to congenital stenosis might well be employed in idiopathic cases—viz., the entire removal of the functionally useless dilated colon and the joining of the small intestine with the anus. As this is a serious operation the attempt to relieve by the formation of an artificial anus may well be made first.

ON THE TOXICITY OF THE URINE.[1]

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The question of the toxicity or non-toxicity of urine has been engaging the attention of scientists for a long time, and the number of authors who have contributed to this subject is very great. From a practical point of view the subject has received its greatest impetus by the appearance of Bouchard's charming book,[1] Paris, 1885; translated, with a preface, by Thomas Oliver. Philadelphia and London, 1894.

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[1] Read at the meeting of the Association of American Physicians, May, 1899.

Without going into a chemical discussion of the agents producing toxicity of urine, this work has offered to us a simple, practical test, which consists in injecting a quantity of urine proportionate to the weight of the animal; if the animal dies the urine is toxic; if not, there is no toxicity. Now, to those of us who believe in auto-infection as an important etiological factor in disease, this test was very welcome; first, because it appealed to us on account of its simplicity; and, secondly, because it seemed to give us an index as to the prime cause of the diseased condition of our patient. It could not be final or complete, because of the fact that the substances which produce toxicity in urine had not been isolated, and, therefore, their origin in the body not disclosed. But, under all circumstances, this test seemed a valuable one for clinical purposes, and, probably, more exact than many others upon which diagnoses are based. As this paper has not been prepared as a literary digest of the subject, but simply to determine a method by which the toxicity of urine can be determined, and to discuss conclusions arising from the comparatively large number of experiments made, we will be justified in beginning with Bouchard. Bouchard's method consists in injecting, in the rabbit, from 30 to 60 c.c. (average 45 c.c.) per kilo of animal into "the posterior marginal vein on the dorsal part of the face as it spreads over the ear." (Bouchard, *loc. cit.*) "We can, even in the rabbit, penetrate directly into the median artery of the ear." He discards subcutaneous injections, because, as he has proven by experiment, absorption does not take place with sufficient rapidity. One of us[2] first began using a modification of Bouchard's methods by injecting the urine into the peritoneal cavity of rabbits under certain aseptic precautions, a method which was, afterward, fully justified by the investigations of Vollhard,[3] by whom is disclosed the fact that in intravenous injections the results are changed by the rapidity of the injection, by the pressure which is used, and, finally, that in two cases extensive thromboses were produced by urine injected intravenously. But that which finally induced us to discard the method of Bouchard and the subsequent observers was the fact that there were so many differences of opinion expressed, especially in connection with the toxicity of urine in pregnancy, and that, with one of us, experiments made with the urine of one patient gave absolutely varying results. The tentative conclusion was arrived at that it was not the observers that were at fault but the method. To prove or disprove this view, both of us began a series of experiments: the one taking the urine of pregnant women during the last month of pregnancy, and the other that of healthy subjects and of patients who could be considered from clinical manifestations, and are so considered by Bouchard, as being affected with gastro-intestinal auto-infection. Bouchard speaks of these cases as being primarily connected with dilatation of the stomach. We have failed to find the stomach dilated. These patients were:

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[1] Leçons sur les Auto-intoxications dans les Maladies, etc.

[2] R. W. Stewart: Toxicity of Urine of Last Month of Pregnancy. The American Journal of Obstetrics and Diseases of Women and Children, xxxv. 3, 1897.

[3] Monatsschrift für Geburtshülfe u. Gynäkologie, Studien zur Pathogenese d. Eklampsie, 1897.

CASE I. Female, aged thirty years, suffering with chronic constipation, headaches and hysterical (neurosal type, Bouchard).

CASE II. Female, aged forty-five years, constipation, Rigg's disease, headache, dyspepsia and recurrent urticaria.

CASE III. Male, aged fifty years, constipation, dyspepsia, asthma (asthmatic form, Bouchard).

CASE IV. Female, aged thirty years, constipation, migraine (neurosal form, Bouchard).

CASE V. Boy, aged nine years, constipation, asthma, repeated attacks of coryza, furuncles (mixed form, Bouchard).

CASE VI. Male, aged forty years, constipation, chronic urticaria (cutaneous form, Bouchard).

CASE VII. Female, aged thirty-nine years, neurasthenia, anæmia (neurosal form, Bouchard).

CASE VIII. Male, aged twenty-two years, constipation, acne vulgaris (cutaneous form, Bouchard).

CASE IX. Boy, aged eleven years, constipation, extreme nervousness, migraine (neurosal form, Bouchard).

CASE X. Female, aged twenty-four years, constipation, chlorosis.

In all we took urine from twenty-four patients, thirteen of the former class and eleven of the latter; also urine from healthy persons, and with this urine one hundred and fifty-four animals were injected. All the experiments were conducted on the strictest principles of surgical asepsis. Details are unnecessary, except to state that all the instruments, vessels, and cotton plugs were carefully sterilized by heat before being used, and the fluid used for injection was always warmed. As it was impossible to obtain as many rabbits as were required, and, as Bouchard neatly puts it, "there are economical necessities before which it is necessary to bow," white mice were used in a large number of cases. That urine under proper conditions may become toxic to white mice was abundantly proven; but, in order to be positive in regard to this, in most of the experiments the ratio of 45 to 1 kilo of animal was increased to 100 to 1 kilo, or even more; but even with this enormous increase we arrived at the distinct conclusion that urine is less toxic to white mice than to rabbits. This was due more to the fact that more mice recovered after having been made ill than rabbits. The experiment, made to show the comparative toxicity of urine upon a mouse and a rabbit, does not, however, prove this.

Experiment XLVI. November 26, 1898, urine taken from a patient during labor, 33 c.cm., injected into a rabbit.

5.03 p.m.

5.13 p.m. Peculiar nodding motion of head; throwing head to one side, rouses himself as though startled.

5.16 p.m. Head drawn backward, pupils dilated, but reacting to light; falls on one side, jerking of all extremities; then jerking confined to muscles of neck; head thrown backward with convulsive motion; some clonic movements of head, ears, and forefeet.

5.17 p.m. Breathing stopped; heart still beating.

5.19 p.m. Lies on side, apparently dead; heart still beating.

5.19¾ p.m. Heart stopped.

Experiment XLII. Same urine, 2 cc. injected into mouse at 9.10 p.m.

9.16 p.m. Drowsy, tending to fall to one side; breathing very rapid.

9.21 p.m. Violent trembling, lasting about one-half minute, then quiet, followed by trembling at regular intervals.

9.35 p.m. Wabbling gait; throws himself from side to side; trembling continues; rolling over, violent clonic convulsions, then tonic spasms with opisthotonos; seems to be struggling for breath; respiration very rapid; these cease and recur.

9.45 p.m. Death in clonic spasm.

The mice die in the same manner that the rabbits do, either quickly, in the manner just described, inside of an hour (thirty-five minutes the longest time in our experiments), or in from twelve to twenty-four hours, the symptoms then being ushered in by drowsiness, lying down in the bottom of the jar, slowness of breathing, convulsions, and then death. The post-mortems have revealed nothing microscopically that could account for death; as far as bad results from the injection are concerned, we found lesions only in two instances: in the one—a mouse—a blood clot in the omentum; in the other, a seropurulent, offensive fluid in the peritoneal cavity; except in cases in which the urine had been standing a comparatively great length of time, as will be referred to later.

The experiments began by investigating the urine passed by the patients mentioned above, in whom toxicity could be expected with reasonable certainty after reading the results of other investigators. It was shown here that in forty mice in only three the urine was toxic. Fresh urine injected immediately, boiled immediately and injected immediately, filtered urine never; but fresh urine when kept sealed to the utter exclusion of air, however, proved toxic in a number of mice when not injected immediately. There seemed to be something in the urine, then, which had the power of rendering it toxic after sufficient time had been given to cause it to develop its activity. With this in view a large series of investigations was begun with the results presented in the following table:

VARIOUS METHODS IN TESTS FOR UTERINE TOXICITY.

	Number of experiments.	*Result: deaths.*
Fresh urine injected immediately	Mice, 14	1
Filtered urine injected immediately, or after 24 hours	Mice, 21	None
Urine boiled immediately and used immediately	Mice, 22	Mice, 2
" " " "	Rabbits, 5	Rabbits, 2
	—27	14 per ct.
Urine boiled immediately and used after 21 hours	Mice, 26	Mice, 10
" " " " "	Rabbits, 5	Rabbits, 2
	—31	39 per ct. +
Urine boiled with boric acid, allowed to stand 24 hours	Mice, 11	Mice, 2
" " " " "	Rabbits. 3	Rabbits, 3
	—14	35 per ct. +
Urine mixed with boric acid, allowed to stand longer than 24 hours	Mice, 18	Mice, 5
" " " " "	Rabbits, 5	Rabbits, 5
	—23	43 per ct.
Fresh urine allowed to stand for a variable length of time longer than 24 hours	Mice, 30	Mice, 20
		66⅔ per ct.

There are, then, one hundred and fifty-four experiments to draw conclusions from, arranged in seven series:

1. In the experiments made with the fresh urine the urine was passed into sterile vessels and injected into mice within a few minutes after it was passed. It will be seen that one mouse died. This is the mouse which had the lesion in the omentum, but died as all the mice died when the urine is toxic. It is difficult to say, precisely, how much the element of shock had to do with its death, especially in view of the fact that the same urine, after it had been boiled and kept for twenty-four hours, did not kill. The only other explanation that might be offered is the one that the operation was not done under strict asepsis.

2. For the purpose of filtration, urine was passed and then immediately placed in the filtering apparatus, either Kitasato or Chamberlin. All the urine used by this method had first been tested as to its toxicity and found non-toxic. It did not matter whether it was injected immediately or kept in sealed vessels for four days, it never produced death.

3. The urine that was boiled immediately and injected immediately—twenty-seven cases in all—had been tested in twelve cases for toxicity and been found non-toxic. In fifteen cases it had not been tested, so that no conclusion could be drawn as to the comparative effect of boiling. In the twelve cases it was not changed by boiling in one way or another. In the fifteen cases it was impossible to make the experiment by injecting urine immediately drawn. The four deaths show that urine may be toxic when passed. In remains to be shown to what extent boiling reduces toxicity, if at all, on account of a possible effect upon it by ferments or other bodies, as well as by bacteria. The latter must be taken into especial consideration, because all of these specimens were taken from women immediately before, during or immediately after labor.

4. In urine that was boiled immediately and used after it had been kept the result was a peculiar one. The longer it was kept the more toxic it became. The following experiment was made to show this: 150 c.cm. was passed by a healthy individual; this was divided into eleven parts, all of which were boiled except one. This one was injected (1.5 c.cm.) into a mouse and found non-toxic; the rest were boiled and put into Erlemeyer flasks. One of these was immediately injected into a mouse and found non-toxic; the rest were injected twenty-four hours apart until all had been used. The result was death in all cases, notwithstanding the fact that the quantity of urine was reduced daily. At first the attempt was made to count the bacteria with an eye-piece micrometer, but this was very soon given up, on account of the enormous increase of bacteria. In these cases, after forty-eight hours, evidences of peritonitis were found in these mice, forming one of the exceptions to the rule stated before. The enormous mortality in this series of experiments, as compared with the general mortality (39 per cent.), is simply explained by the fact that all the other experiments were made in cold weather, from November to March, while this series was done during the very warm weather of spring (from 70° to 85° F., in the middle of the day). It seems, then, that boiling once is sufficient to kill bacteria, but not their spores; and, as in sterilizing milk, as was shown by Flügge, the spores developed and finally produced the same effects as were primarily produced by the bacteria.

5. Some authors have recommended the addition of boric acid to prevent development of bacteria; for this reason the series was instituted. Here it was also shown that little influence was exerted, and that the longer the mixture was kept the greater the mortality. In a series published by one of us (Stewart, *loc. cit.*) the mortality was 100 per cent. In this series no account was taken of time of taking urine and its injection, although the table seems to show that urine kept with boric acid does not become toxic more rapidly than urine kept and used after being boiled; this, again, is on account of the difference in outside temperature, all of the experiments being made during cold weather.

6. In regard to fresh urine which has been kept for longer than twenty-four hours, it need only be said that the largest mortality was arrived at by this method; and in some of the mice that lived longer than eighteen hours there were also present evidences of peritonitis.

As a result of these investigations we beg leave to present the following conclusions as to the method:

1. Fresh urine injected immediately can be safely used.

2. Filtered urine, immediately filtered and immediately injected, can be safely used.

3. Urine boiled and injected immediately should not be used unless

error caused by possible changes within the body of the patient be first eliminated.

4. The addition of boric acid does not give reliable results.
5. Urine should never be used that has stood for twenty-four hours.
6. The method cannot be used for exact determinations of toxicity in that a range of from 25 per cent. to 50 per cent. of error is found for individual cases.

The conclusions as to toxicity of urine can be only tentative as applied to all the cases, but they are positive for the majority. If the table be examined it will be seen that those two methods which exclude bacterial activity absolutely after the urine is passed are followed by comparatively no mortality; in fresh urine immediately used, only one death out of fourteen; in filtered urine, no deaths, even after the urine had been kept as long as four days; in urine with boric acid used before the lapse of twenty-four hours, a mortality of 39 per cent.; after twenty-four hours, a mortality of 43 per cent.; in boiled urine kept for longer than twenty-four hours, a mortality of 39 per cent.; and in fresh urine kept for longer than twenty-fours, a mortality of 66 per cent.

It would seem, then, that most of the toxicity of urine was due to the formation of substances the result of the action of bacteria upon some b dy or bodies in the urine. As a result of this investigation, we are not justified in stating that there is no other toxicity except that due to bacterial activity; but we are justified in making the statement that all those investigations that have been made in which this activity has been overlooked are to be regarded as inconclusive.

Finally, one of us wishes to make a scientific retraction of a statement made in a paper read before this Society. In connection with some investigations made upon chlorosis, one of us found a toxic body in the urine; this toxic body, in the light of the present investigations, was not the result of chlorosis but of a faulty method. In so far as this body has any effect upon the theory of the origin of chlorosis, this theory is hereby discarded.

THE DISEASE OF CONVULSIVE TIC (GILLES DE LA TOURETTE'S DISEASE),

WITH SPECIAL REFERENCE TO A HYPOTHESIS AS TO ETIOLOGY.

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Some confusion still exists in the classification of conscious spasmodic movements which are not manifestations of well-established clinical entities, such as Sydenham's chorea, Jacksonian epilepsy, etc. Of these one class has been described by different authors with some, but not entire, uniformity of meaning, under the titles of habit or mimic spasm, habit chorea, spasmodic tic, convulsive tic, etc. However, when the attempt has been made to isolate the symptom-complex of conscious spasmodic movements, which is considered in this paper, the specific name employed has been Gilles de la Tourette's disease, or maladie des tics convulsifs, even in books other than French. Because I know no simpler English equivalent I have also used these names, merely translating literally into English the latter one. So much in explanation of titles, which, no doubt, appear unnecessarily long.

Gilles de la Tourette's disease, corresponding in part to habit spasm, as described by Gowers, but in reference to which Charcot, and particularly his pupils, Gilles de la Tourette and Guignon, pointed out special symptoms, is a painless nervous affection found chiefly in children from six to sixteen years of age who are of marked neurotic habit and heredity. Besides the spasmodic contraction of face muscles, notably those about the eyes and the zygomatici, but also of the trapezius, sterno-mastoid, the splenei muscles, those finding attachment to the hyoid bone, of the larynx, and, lastly, of the extremities, this variety of tic presents also special speech symptoms.

The following comprises a brief clinical picture condensed from Oppenheim's description:

The first symptom usually noticed is twitching of the facial muscles, especially a blinking of the eyes, a drawing of the mouth to one side, opening and closing it quickly, etc. Frequently such acts are accompanied by contractions of the neck muscles. In the course of the disease, perhaps after the lapse of considerable time, movements apparently purposive may be noticed, seemingly the result of an effect or bearing the impress of habit; or the subject may seem to be carrying out a reflex movement, as, for instance, he rubs his nose, grasps his chin, loosens his collar, etc., and these movements are repeated in a stereotyped way. The patient is again and again compelled to go through the same performances, so that the original, in all probability purposive, act becomes pathological. Nearly always co-ordinate tic exists—that is, habitual movement combinations—or such as are the result of an irresistible impulse. In nearly all cases also the respiratory organs and structures engaged in voice production are implicated. This may consist of mere sighing, sniffing, sobbing, barking, etc.; may take the form of repeating words which may be senseless, but phonetically allied (verbigeration): of calling out profane or obscene words (coprolalia); of repeating one or more times the last word of a sentence they have just heard (echolalia); of mimicking a movement they see (echokenesis); or of giving verbal expression to a thought uppermost in the mind (tic de pensée). Imperative conceptions, such as counting up to a certain number (arithmomania); of having to refrain from touching certain things (delire du toucher); or to abstain from naming certain objects, therefore, perhaps, spelling them (onomatomania), etc., also exist.[1]

As regards a differential diagnosis from affections that present movements nearest alike, Sachs remarks that muscular action in the disease of convulsive tic is much more systematic and more intermittent than in chorea minor; that the difficulties of speech in the latter affection are the very reverse of the explosive utterance previously mentioned; and that, moreover, echolalia and coprolalia never occur. The same author believes that Gilles de la Tourette's disease may bear a superficial resemblance to hysteria, but that hysterical stigmata are generally wanting, and that the latter affection presents no such constant repetition of more or less convulsive movements. The last statement, strictly speaking, is not true unless the epileptoid symptoms of grand hysteria be excluded, but movements in the latter case do not resemble those of tic, because occurring while consciousness is more or less disturbed, and also because the separate acts of co-ordination are more deliberate, while the character of the act is so far removed from what is ordinary that it does not appear purposive.

As to hysterical stigmata, their not infrequent presence in neurotic children at about the age of puberty leads me to doubt that they are generally absent, and I therefore deem it best here, as always, to depend upon the general impression received, in deciding whether the patient's movements were due to chorea major or would need to be classified under the habit spasms. It must be recognized, however, that an entirely satisfactory differential diagnosis is frequently an impossibility in practice, for the reason that upon a substratum of hereditary tendencies there is sometimes superimposed a suffused symptom-complex due to several existent neuroses. Owing to this fact, the effect of one may seem a part or result of another affection whose symptoms at the time of examination are more prominent. This may become important in considering the prognosis.

The mental element in Gilles de la Tourette's disease is well established, and, as in many forms of psychic derangement, its chief manifestation has to do with an exaggerated yet defective faculty of association. Witness the perception of a subject in certain somnambulistic states, who will mistake words spoken to him for others sounding somewhat alike, and will repeat the error again and again, while an existing normal or hyperacute sense of hearing enables us to exclude a peripheral defect of transmission.

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[1] There is a disease seen in adults which is apparently identical in origin. It occurs in persons described by Beard as "jumpers," and is also known as latah in Southern Asia, and as miryachit in Eastern Siberia. In this form echokenesis with coprolalia appears to be especially characteristic.

A patient with katatonia and the child with the disease of convulsive tic alike possess the habit of repeating long lists of words, perhaps of no meaning, but certain to bear a phonetic relation to each other. Both apparently derive the same satisfaction therefrom. We find examples of associative ideation in the delusion systems of paranoia, which are forever being elaborated and added to by new combinations or newly assumed facts bearing a plausible relation to the chain of delusions previously entertained, while we may state upon the authority of Kraepelin, that the patient in the maniacal state of periodic or circular insanity, who occasionally betrays keen insight as to his immediate society or into passing events by appropriate, trenchant remarks, does so by comparisons which, if carefully analyzed, will be found largely based upon an exaggerated perception, also upon the ability to form combinations which are dependent upon the power of imagination rather than upon conclusions which have been logically deduced. In a measure, the same is true of persons mentally healthy if the imagination present the dominating faculty. Cerebration in all these cases, therefore, whether perceptive or ideational, is strong in association. There exist great powers of receptivity and of associative ideation, unequalled, however, by higher inhibitive judgment. Impulse due to sensory perception is habitually transmitted to motile centres after having been weighed but cursorily in the balance of reason. Hence, where inhibitive judgment is for a time suspended the individual may become imitative in that he responds faithfully to impressions received from without, as does the string of an instrument that vibrates audibly to extraneous sound of the same pitch. At other times such a person becomes subjectively automatic, for reasons to be presently noted.

Conscious, involuntary, purposeless movements may arise from direct irritation of motor neurons exerted centrally or reflexly through the medium of a peripheral sensory impulse. That is another form of movement, without volition, however, in which we must assume *that an impulse originating in sense-perception is associated with perception memories, carried thence to mechanisms storing associated memories of volition, and terminating in action represented by the latter, the inhibitative function of the will (that selective quality of the mind evolved by co-ordination and synthesis of thought memories) being held meantime in abeyance.*

In this way we may explain an apparently purposive act performed involuntarily and, moreover, reflexly.

In a patient with the disease of convulsive tic we have to do with a brain powerful in association of impressions, and one which, weak in inhibition, has acquired the habit of permitting conscious, involuntary, purposive movements.

Some American authors, among them Osler and H. C. Wood, speak of the psychic state in the affection we are considering as characterized by the existence of fixed ideas. I believe that "fixed ideas" is a bad term to employ in this connection, because the same has long been used to designate uncorrected—*i. e.*, insane delusions.

"Imperative conceptions" (corresponding to the Zwangsvorstellungen of the Germans) has been suggested, and is better because possessing a more specific meaning. Gould defines imperative conceptions as "false ideas that an insane person dwells upon, and which he cannot expel from his mind, even when he knows them to be absurd, and which dominate his actions." Admitting that the existence of imperative conceptions evidences a mentality departing in something from an ideal psychic prototype, we must nevertheless all agree, I believe, that they do not prove insanity. In reference to this form of dominant idea, Osler, in his monograph *On Chorea*, quotes the proclivity of Dr. Samuel Johnson for touching posts. This act was so necessary to the doctor's well-being that he frequently turned back if, for some reason, he had neglected to touch some of the posts in passing, a characteristic example of an imperative conception in a man who, we must acknowledge, was sane, and who was not otherwise regarded by his contemporaries. In fact, imperative conceptions are widely prevalent in our day; they are common enough among the much-worried and overworked business man, and, with some observation, will be found not unknown among physicians. So far as I know, where writers have attempted any explanation of their existence, they have been regarded as central in origin. Oppenheim defines them as "ideas not evolved by association, but which arise spontaneously and violently force themselves into consciousness." Central they must be—in all probability, the effect of irritation of memory centres—but that their origin be unassociative one must doubt, as likely involving an impossibility, since the products of psychic, like those of physical energy, must ever depend upon what has previously existed. Aside from obvious refutation of his own definition, which the author last cited gives within a paragraph by quoting the desire which arises in some people to plunge themselves from a height, or to wound themselves when looking at sharp instruments, we know that education of the babe is entirely founded upon sensory perception of its environment; later, upon associated memories of these impressions, from which judgment is at last evolved. Indeed, can we imagine the occurrence of subjective cerebration unassociated with previous experience? I believe not.

It will not be out of place also at this time to record several characteristics of imperative conceptions which show their close relationship to the imagination and the emotions rather than to the more deliberate faculty of reason. Their possessor is usually not only conscious of an impression foreign to his normal mental habit, but he frequently entertains the idea with unwillingness and even with repugnance. In close association with this effect are fear and pleasure. The subject may experience all three emotions in reference to a single act, the combination of any two, or perhaps but one. Repugnance is felt because of the unwillingness to give way to an impression which he knows to be absurd; fear, because of possible evil which may obtain if he fail in the precaution prompted by his impulse, while pleasure appears as an inward satisfaction which the person feels is in no way compatible with his senseless movements. In those cases in which there is fear of the consequences of the act, and pleasure despite the knowledge of doing wrong, sexual excitement may be regarded as the underlying factor; on this account, and because one must assume more or less loss of consciousness on the part of the subject at the time of carrying out his impulse, this class is to be differentiated from the more innocent imperative conceptions and their effects. This phenomenon deserves discussion in reference to a number of varieties of insanity and degenerative states; but I shall consider it only in reference to the disease which is the subject of this paper.

Let us picture to ourselves a man seated in a room, who, determining to leave and to lock it, proceeds to carry his ideas into immediate effect. Having passed out he turns the key, and at the same time is chiefly conscious of this act. There are, however, any number of subconscious ideas which, as the result of experience, are stored up as memories and stand in close relation. Some of these would naturally refer to the security of locking one's door, to the fact that a door may not be locked, although the key seems to have been turned properly, or that such a room may easily be entered by thieves, etc. All such associated ideas lie dormant, as it were, in the normal mind unless something occurs to bring one or more into active consciousness—as, for instance, if the key seems to slip in turning, or the door upon being tried appears to give, the matter of making certain the same was fast would be gone over again, upon which it would be dismissed from the mind. Not so, however, in a person possessing an imperative conception in reference to the act narrated. The idea that, after all, the door may not be locked cannot be banished. This notion may have originated in fact, but the mere possibility of its occurrence, in some way brought to the mind, would suffice. If he knows his failing, such a person is likely to be unusually careful in his actions. In this case, as an additional precaution, he may wait a moment before withdrawing the key from the lock—perhaps may measure his time by counting up to a certain number. This is done to be able later on to range against the imperative conception something more than the mere memory of essential movements. All to no purpose; the feeling of doubt dominates every other consideration, and, by the aid of imagination's fears, all but permeates the mind, thus crowding out the reasonable facts. If, by exercise of extraordinary force of will, he conquers his impulse, this person will continue his way, but in an uncomfortable frame of mind; if, however, the imperative conception prevails and he returns once more to try the door, he is at once conscious of a certain satisfaction and of the fact that he has committed an absurdity. In reference to such cerebration, I believe we may assume *that the centres of judgment have either inhibitively overcome or have given way to a reflex, effected by sense-perception and passing from memory of perception to memory mechanism, recording an act (to have tried the door, thus proving it locked), and thence to the corresponding motor centre.* It will also be noted in the case in point that the resulting acts were approximately voluntary. A patient with Gilles de la Tourette's disease presenting the symptom of arithmomania in the beginning counts voluntarily also; but as time goes by the original significance of doing so in reference to certain acts is lost, since the patient has now acquired the habit of counting in reference to almost any movement, or the counting may have originated entirely in the idea of warding off evil things after the manner of a charm, a notion which the child-mind has abundant opportunity to acquire and grasps with avidity. Having begun by counting voluntarily as an impulse prompted by an imperative conception, the patient soon does so by associative automatism. Arithmomania, therefore, may serve as a type of symptom which offers a connecting link, as it were, between conscious voluntary and conscious involuntary associative movements, such as a mimic spasm, echolalia, coprolalia, and tic de pensée always represent. I look upon both varieties of movement, however, as completed central reflexes. That such reflex action should at one time result in movement approximating volition and at another in an involuntary act, depends upon frequency of performance, and hence, in the latter case, to the tendency to automatism which exists normally. The voluntary act of locking a door is a common one indeed, yet, compared to the frequency with which we transform a thought into words, becomes one of comparative rarity. We give, for instance, that person considerable credit who, while performing an act requiring appreciable mental supervision, can at the same time speak in reference to a different line of thought. I call to mind a professor who delighted in the fad of lecturing to his students while reading a manuscript which he would subsequently prove he had digested. On the other hand, since it is a faculty common to all, we do not regard it as extraordinary that one may converse or think with concentration while walking, turning into proper streets upon our way, avoiding the dangers of crowded thoroughfares, etc.

A word in reference to that most characteristic symptom coprolalia. This peculiar bent may arise from the better opportunity of older children to observe the habit of profane language in others; but even where the child be of tender years the opportunity of hearing profane language will some time occur, and its impression, perhaps, rendered more indelible as soon as it learns these words belong to things forbidden. Aside from these possible sources, however, children approaching the age of puberty, or, if younger (as is not infrequent in neuropathic types), who are sexually precocious, the use of profane or obscene language as an effect of sexual excitement is to be considered. At least two German alienists have within recent years demonstrated the close connection between perverse sexuality and the desire on the part of the subject to injure or to humiliate either the object of his passion or himself. That the method of humiliation may take the form of abuse by violent and unseemly language is equally certain. Moreover, Kraepelin says that a sort of physiological sexual perversity may exist at about the age of puberty, finding expression in most peculiar ways, and which, I believe, without doubt may be referred to the newly-developing, obscure physical impulses which are as yet uncomprehended and uncontrolled. Pertinent in connection is Gowers' observation concerning habit spasm, that in boys the affection often is due to masturbation, and that from this cause severe cases are sometimes met with.

Before concluding with symptoms, it is well to call to mind that the pathological symptom-complex which we are discussing, in common with many affections of the nervous system, has prototyes which, although clearly indicating unstable nervous action, must nevertheless be regarded as within physiological limits, the pathological forms being merely distinguished by intensity of manifestation. Thus the habit of some to frequently express opinions without a moment's thought, sometimes so quickly that such persons are themselves scarcely aware, and which they regret the next moment, may be cited as exemplifying physiological tic de pensée. Again, instances in which persons to be regarded as normal acquire one or a few associative acts are so numerous as to make it unnecessary to submit examples.

Mention must also be made that in all probability all the muscle contractions in Gilles de la Tourette's disease must not be considered as reflexes emanating from memory centres, although I believe those which are characteristic are. In addition to the latter, however, there are muscular twitchings that do not differ from those common to many nervous states, and which may be regarded as inanition twitchings due to abnormally sensitive or irritated muscle centres, so quickly do they yield to rest and a better metabolism.

Prognosis. Being a functional disease, prognosis as to life scarcely enters into consideration; but as chorea minor sometimes precedes or follows, or may occur concomitantly, one needs to be on the lookout for heart lesions, in order to avoid seeming error or an unpleasant surprise. The same applies to serious results due to an accompanying epilepsy. As regards recovery, Osler, in his work on *Practice*, quoting Guignon, gives the prognosis as bad; but in his monograph *On Chorea and Choreiform Affections*, the same author regards the prognosis as uncertain, and reports a case which ended in complete recovery. Oppenheim records the fact that some authors regard Gilles de la Tourette's disease as incurable, but states that this is incorrect, and also reports entire recovery in several cases; in one, a case of four or five years' standing. This took place with the beginning of the menses. This author believes, however, that an entirely favorable termination occurs only in a small minority of cases. Gowers' more favorable observation in relation to habit spasm, that habit movements usually cease after a time, but sometimes persist, is obviously not entirely applicable to the special form being considered. A number of other authors content themselves by stating that the disease is chronic, lasts for years, etc. We may say that the number of complete recoveries will be small, but that in a considerable number of cases which are taken in hand early, well-directed treatment will result in so great an amelioration of distressing symptoms as once more to make these patients socially fit under ordinary circumstances. Under stress of emotion we may expect lapses to occur. Analogous to a frequent termination in Graves' disease we obtain "recovery with defect."

TREATMENT. The fact that this will be based upon methods employed in a number of so-called functional diseases merely emphasizes the need for intelligent supervision. The first indication comprises the patient's removal to surroundings which will supply quiet, good hygiene, and discipline administered in kindness. This step loses its empiricism and becomes rational if we may assume that in his new home the patient's mind, to a great extent, begins to store up memories unassociated with the development of his perverted habit, while perhaps of even greater importance is the stimulus of inhibitive, conscious attention which lies in environment both novel and pleasing. It is as well to enlist voluntary effort to inhibit movements. The patient's interest in this respect may sometimes better be engaged by a system of rewards. On the other hand, punishments or threats of it inspire disquieting emotion, and are therefore injurious.

Having in all probability to do with toxic substances which act as irritants to nerve structure, we strive for their constant elimination. As regards the alimentary tract, it is well to begin with small doses of calomel, perhaps combined with ipecac, the same to be followed up, after free catharsis has been established, by salines in just sufficient doses to keep the bowels open and the appetite active. If, owing to forced feeding or other cause, the bowels become sluggish the sequence is to be repeated. The presence of the uric acid diathesis should be combated by reduction in the allowance of meats, especially salt meats, and of other nitrogenous substances and of the carbohydrates. Vegetables, particularly such as are rich in alkaline salts, and also acid fruits, are permissible. In all cases, however, aside from generalities, individual idiosyncrasies should be noted and the character of the diet arranged in accordance therewith. As regards internal medication, arsenic holds first place as to frequency of administration, and is lauded by Gowers and Weir Mitchell for the treatmentof habit spasm. Although Oppenheim considers it valueless in Gilles de a Tourette's disease, I believe I have seen good results follow its use. The author last quoted has as little faith in hyoscine and escrine, although after using the latter he was able to record cessation of movements for several days in one case, but only after intoxication had taken place. One will be compelled to give bromides at times, but their constant use cannot be recommended. When the digestive tract is in good condition and the diet full but judicious, the ordinary tonic mixtures, sometimes largely prescribed, may be dispensed with. In many cases their employment had better be altogether eliminated, as the customary alcoholic menstruum is badly borne, as a rule. Even in small quantities it may derange digestion and affect mental control. Warm baths and galvanic electricity may be administered for their quieting effect. The skin should be kept active by means of the former; cold sponges may be given where well borne. Some plan of forced nutrition based upon the Weir Mitchell treatment is always indicated, but demands particular vigilance to note that digestion keeps pace with the increased quantities of food consumed. Success in effecting an increase in body-weight will be accompanied by a cessation of the inanition twitchings previously mentioned.

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ANEURISM OF THE CORONARY ARTERY; A REPORT OF TWO CASES.

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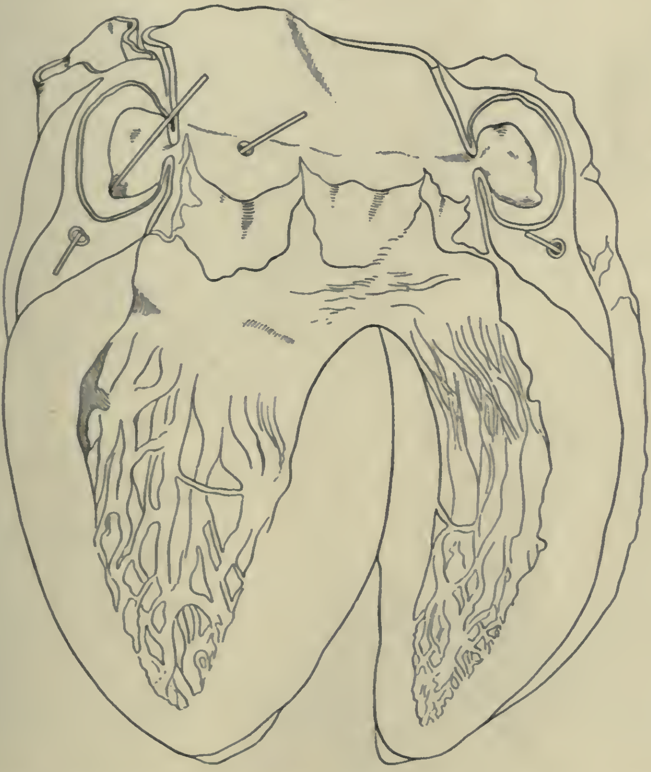
(From the Pathological Laboratory of Rush Medical College.)

THE specimens here described were both kindly given to the writer by Dr. Ludvig Hektoen, and are reported somewhat in detail on account of the great rarity of the conditions.

CASE I.—The subject, a man aged about forty years, was found dead in the street, the autopsy being performed by Dr. L. J. Mitchell. Unfortunately, the body was never identified and nothing could be learned concerning his history.

At the post-mortem examination no evidence of violence was discovered. The brain, alimentary tract, liver, and spleen were normal in appearance. A few pleuritic adhesions bound down the lungs to the chest wall. The kidneys showed the effects of a slight chronic diffuse nephritis. The chief interest centred in the heart and adjoining vessels. The weight of the heart is 300 grms. Externally the specimen presents a rounded eminence, situated over the left auricle, behind and to the left of the root of the pulmonary artery. Upon laying open the cavities the mitral, tricuspid, and pulmonary valves are seen to be normal. The heart muscle is of a natural color. The semilunar valves are thin, translucent, not deformed, and close tightly. Near the base of the aorta and in the sinuses of Valsalva the intima is dotted with a few whitish areas where a moderate degree of sclerosis and fatty degeneration has taken place. These changes, however, are not more marked than is usual at the age of forty-eight. Nowhere is there any deposit of lime salts. The opening of the left coronary

FIG. 1.



artery is enlarged and irregular. Section reveals just beyond the orifice a dilatation of the artery wall outward, forward, and downward, forming a tumor the size of a pigeon's egg. This sac is nearly filled with lamillated blood-clot, leaving a cavity about as large as a hazel-nut. Around the adherent clot the wall of the artery can be traced distinctly. The distal portion of the aneurism communicates with the artery beyond. The dilatation extends to the division of the vessel into its two branches. In the posterior or transverse branch the wall is sclerotic but calcified; the anterior or descending branch is also thickened and its lumen filled with a thrombus. Only slight atheromatous changes are present in the right coronary artery.

Microscopical Examination. Sections of the aneurism were cut parallel to the coronary artery and including its origin from the aorta. Immediately above the orifice the aortic wall is infiltrated, the invasion of round cells apparently starting at a break in the intima and encroaching upon the middle coat. Several small areas of necrotic tissue replace the middle and inner layers of the aorta at the point of junction with the coronary. The thrombus, on the whole, is homogeneous, but in some places is striated. Lining the inner surface of the sac is a thin, irregular layer of relatively recent blood-clot filled with round cells and beginning to organize. The arterial wall surrounding the aneurism is somewhat thickened, and in some places there are streaks or clusters of infiltrating round cells—evidence of inflammation. A cross section of the descending branch of the left coronary exhibits a sclerosis of the wall and a lumen filled with blood-clot, which is pale and stains homogeneously, but is not adherent, and, therefore, probably of postmortem origin. Such a view is confirmed by the absence of interstitial changes in the heart muscle supplied by this vessel. An interesting condition is found in a section from one of the columnæ carnæ in the left ventricle. In regions the cement spaces uniting the ends of the muscular fibres are much widened, and more rarely a fibre is itself ruptured, leaving the broken ends rough and lying in a changed direction. This separation and rupture of fibres, known respectively as segmentation and fragmentation, was first observed by Renaut[1] in 1877. By many subsequent investigators, and particularly by Hektoen,[2] in an exhaustive study, segmentation has been found quite constantly in cases of sudden death. The latter author recorded its presence in every one of ten cases of instantaneous death due to traumatism.

CASE II.—*Clinical History.* J. H. W., a man, aged thirty-nine years, and native born, was admitted to the Cook County Hospital, October 27, 1898. A telegraph operator by occupation, he had for a year previous been employed as an advertising agent. Both maternal grandfather and grandmother died of apoplexy; mother of heart disease. He always smoked and chewed tobacco, and used alcohol to excess. Several years ago he contracted syphilis, and one year ago had a paralytic stroke. His last illness began four weeks before entrance to the hospital, when he noticed numbness and tingling in the legs and feet, and later over the whole body. During this time he had several convulsions. At the time of admission he was having general convulsions of about one minute's duration, at intervals of five minutes.

Physical Examination. Nutrition good. The pupils were equal and reacted. The tongue protruded to the left and was tremulous. There was paralysis of the left facial muscles. Two scars of recent origin were noted above the left eye; also an old depression. Right radial pulse full and strong, left weaker. Heart sounds loud and irregular. Lungs normal. Left arm and leg partially paralyzed. Temperature, 99.4°; pulse, 124. Urine acid, 1032, faint trace of albumin, granular casts.

The convulsions recurred several times a day, always accompanied by unconsciousness. Subsequently he developed a bronchopneumonia, from the immediate effects of which he died, November 5, 1898.

Post-mortem Examination. Body of a rather slender, well-nourished and developed man. Rigor mortis marked; lividity posteriorly. Mucous membranes of the upper respiratory passages showed no lesion.

The skull and scalp exhibited no changes externally. Internally the right parietal bone showed some fine erosions, corresponding to a circular area of adhesions between the pia and the dura mater. In the adhesions was a grayish-yellow layer of granulation tissue of rather soft consistency, flattened and circular in outline. Around this district the cortex was somewhat softened, but the remainder of the brain, as well as the pons, medulla, and cerebellum, was normal. The vessels at the base of the brain showed nodular and irregular yellowish thickenings.

The abdominal, pleural, and pericardial cavities were empty, their lining membranes smooth.

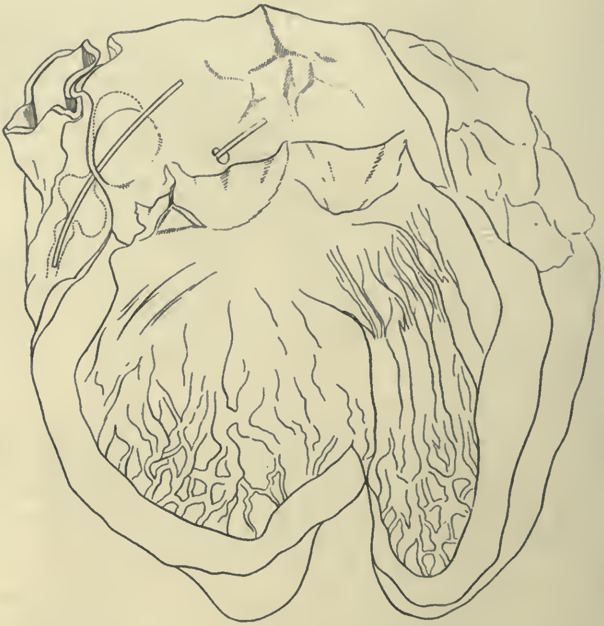
The spleen presented no abnormal appearance. The liver weighed 1400 grms., and cut with normal resistance; it showed some congestion of the centres of the lobules. The pancreas and intestines appeared normal. The kidneys weighed 300 grms. The capsules were adherent in places, and the fœtal lobulations were still present. The cortices were rather wider than normal, the markings distinct, the arteries prominent. The testicles were normal.

Over the upper lobe of the right lung were a few firm adhesions. The lungs crepitated, excepting the left lower lobe, which weighed 450 grms., sank in water, and was bluish in color. On the cut surface were numerous grayish-red granular areas, varying in size from that of a split pea to 1 or 2 cm. in diameter. The lung tissue between these areas was collapsed and deep red or bluish-red in color. The remaining parts of the lungs were considerably congested, and the larger bronchi contained mucopus. The peribronchial glands were normal.

The *heart* weighs 550 grms. There is marked thickening of the left ventricular wall. The tricuspid, pulmonary, and ventral valves appear normal. The endocardium is smooth, excepting that the free margin of the aortic valves is rough, thickened, and sclerosed. Just below the junction of the left and anterior semilunar valves is a small bulging in the septum, which admits the tip of the index finger, and is lined with a dense fibrous tissue. Anteriorly the aneurism and the sinus of Valsalva of the posterior pulmonary valve are separated by only a thin partition that is translucent. The "undefended space" situated to the right of this cavity is unaffected. Above the left semilunar valve is a bulging of the aortic wall upward and forward into the loose periaortic tissue, so that the artery is undermined. Bordering on this aneurism is the left coronary orifice, which is of normal size. Immediately beyond the opening, however, is a fusiform dilatation of the arterial wall, large enough to contain a hazel-nut, and extending for the most part posteriorly and to the right. Its walls are streaked with yellowish spots, and in places calcareous scales can be peeled off. Beyond this cavity is a second and smaller dilatation of the right wall.

The beginning of the aorta is very much thickened, the intima irregularly fissured, and similar changes exist throughout the entire thoracic aorta.

FIG. 2.



Microscopical Examination. In the sections the intima is seen to be overlaid by an old thrombus. The artery wall is thickened. Near the orifice the continuity of the intima is broken, and there has been an invasion of round cells. At this point, and in other places within the aneurism, the inner layer has been replaced by calcareous deposits. Some of these calcareous changes extend deep down into the middle coat of the artery.

The heart presents the picture of an extreme myocarditis. The bloodvessels are sclerosed and surrounded by dense fibrous tissue. Some of the muscle fibres are atrophied, some have disappeared, leaving large areas that are occupied by interstitial cells.

Here, also, as in the previous case, there is a segmentation and fragmentation of the muscle fibres.

I was surprised in reading the literature to learn that while aneurisms of the heart and of the root of the aorta are comparatively common, so very few instances of coronary aneurism have been described. The accompanying table comprises all the cases that I could find in which the aneurism unquestionably arose in the coronary arteries.

Both left and right coronaries seem to be involved about an equal number of times. The usual site of the dilatation is very near the origin from the aorta in the loose cellular tissue, so well described by

Vestberg[20] as the "periaortic space." This location is also a favorite place for interparietal aneurisms of the heart.

The affection vastly predominates in males.

Age has less influence in the etiology than one would suspect, considering its rôle as a predisposing cause in aneurism elsewhere. More cases were under forty than over that age. A remarkable fact is its occurrence in two very young children.

Occupation is not an important factor, only two subjects being engaged in heavy work. Two individuals gave a history of rheumatism and excessive drinking.

The diagnosis of the lesion was never made during life, since, unless rupture took place, it gave rise to no adventitious sounds, and its location over the auricle did not increase the area of cardiac dulness.

It is doubtful if uncomplicated, unruptured coronary aneurism has any characteristic symptoms. In two cases dyspnœa, cough, and transient pains over the heart were present, but could be better attributed to coexisting bronchitis and valvular insufficiency of the heart.

The disease usually terminates in death from rupture of the aneurism into the pericardium, eleven of the nineteen cases dying from this complication. In the others the aneurism was apparently benign, and was accidentally discovered at autopsy.

Authors.	Sex.	Age.	Occupation.	Cause of death.	Remarks.
Bougon . . .	M.	...	Soldier,	Rupture into pericardium.	Right coronary, one inch from origin.
Otto . . .	M.	40	....	Rupture into pericardium.	
Merat . . .	M.	...	....	Not stated.	Aneurism of small size.
Peste . . .	M.	77	Currier,	Rupture into pericardium.	Left cornary, near origin, small size.
St. Bartholomew's Hosp. Museum.	M.	11	....	Not stated.	Several small pouches.
Stevenson . .	M.	...	Soldier,	Rupture into pericardium.	Right coronary, size of walnut, also aneurism of aorta.
Peacock . . .	M.	51	Butcher,	"Bronchitis"?	Left coronary, size of pigeon's egg.
Bristowe . .	M.	22	Sailor,	Paraplegia.	Both arteries, several small aneurisms; right coronary, size of walnut.
Ward . . .	M.	38	Laborer,	Rupture into pericardium.	Aortic aneurism.
Heuse . . .	M.	21	Waiter,	Rupture into pericardium.	Both arteries; multiple aneurisms.
Finnell . . .	F.	25	....	Not discovered	Right coronary.
Markoe . . .	F.	30	....	Rupture into pericardium.	Size of hazel-nut.
Clark . . .	M.	30	Waiter,	Rupture into pericardium.	Left coronary, near origin.
Ogle . . .	M.	26	Blacksmith,	Rupture into pericardium.	Both arteries, small size.
Buchner .	...	...	....	....	Left coronary.
Crisp . . .	M.	63	Carpenter,	Rupture into pericardium.	Right coronary.
Malet . . .	M.	5	....	Rupture into pericardium.	Left coronary.
Hektoen . .	M.	48	....	Not known.	Left coronary, near origin, size of pigeon's egg.
Hektoen . .	M.	39	Telegraph operator,	Bronchopneumonia.	Left coronary, size of hazel-nut.

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A CRITICAL SUMMARY OF RECENT LITERATURE

CONCERNING

THE MOSQUITO AS AN AGENT IN THE TRANSMISSION OF MALARIA.

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PREVIOUS to the year 1898 little was known concerning the means of transmission of malaria from one individual to another. This subject had occupied the attention of many observers who had devoted much time to the study of the disease. Inoculation experiments had positively proved that malaria could be transmitted from one individual to another by the subcutaneous injection of blood containing living malarial parasites, but there was little evidence pointing to the ordinary modes of transmission of the disease that could be regarded as at all convincing. We were utterly ignorant of the form in which the malarial parasite existed outside the body, and equally in the dark as to the manner in which it entered. The theories advanced were purely hypothetical, and without experimental foundation on which to base them.

The results of experimental work published during the past year have done much toward dispelling the mist that has so long obscured this important problem. The work of Surgeon-Major Ronald Ross, of the Indian Medical Service, concerning the cultivation of the *proteosoma labbé* (one of the malarial parasites of avian blood) in gray mosquitoes, afforded the first convincing evidence that the mosquito was probably one agent by means of which malaria could be conveyed from bird to bird, and possibly from man to man. The mosquito theory of the transmission of malaria is not a new one. It was first advanced many decades ago, but was first vigorously supported by Manson, from whom Ross received his inspiration to carry out the investigations which have yielded such brilliant results. As early as 1894, Manson[1] suggested that the mosquito might be the intermedatie host for the extra-corporeal form of the malarial parasite, just as it is the intermediate host of the filaria nocturna, and that the manner of propagation of the two diseases was analogous. After enumerating several features in which the filaria nocturna and the malarial parasite resemble each other, Manson, at that early date, expressed himself as follows: "The parallel is very complete; the conditions, the requirements, and the problem to be solved are apparently identical for both parasites. As the problem and conditions are the same for both organisms the solution of the problem may also be the same for both. If this be the case, the mosquito having been shown to be the agent by which the filaria is removed from the human bloodvessels, this, or a similar suctorial insect, must be the agent which removes from the human bloodvessels those forms of the malarial organism which are destined to continue the existence of this organism outside the body. It must, therefore, be in this or in a similar suctorial insect or insects that the first stages of the extra-corporeal life of the malarial organism are passed." He believed that the flagellated body was the first extra-corporeal stage of the malarial parasite. He suggested that the flagella, on breaking away from the residual body or pigment-containing sphere, then, by virtue of their vibratory movement, penetrate the cells of some organ of the insect.

In 1896, Manson, in his Goulstonian lectures,[2] laid especial emphasis on the part which he believed the flagellate organisms played in the propagation of the parasite outside the body. He held that the crescentic body of æstivo-autumnal malaria and the tertian and quartan spherical bodies which proceed to flagellation were the "extra-corporeal sporulating homologues of the intra-corporeal spore; that the flagellum is the extra-corporeal homologue of the intra-corporeal spore." Both types of sporulating plasmodium were believed to have corresponding functions, both arising from the same source; one is the germ of the plasmodium inside the human body; the other is the germ of the plasmodium outside the human body; both function in the propagation of the parasite.

Laveran and Manneberg had also regarded the mosquito theory with favor, but had not associated the flagellum with the question of the transmission of infections. Calandrucio had failed to observe developmental changes in the malarial parasites ingested by mosquitoes. Such changes were first observed by Ross, who, in 1895 and 1896, studied the behavior of the parasites in the blood within the stomach of mosquitoes fed upon injected human beings. He fed mosquitoes on patients suffering from æstivo-autumnal malaria, whose blood contained large numbers of crescents, and instead of finding no transformation, observed that from 40 to 50 per cent. of the crescents proceeded to flagellation and liberation of flagella. Beyond this, however, he was unable at this time to trace the development of the parasite within the body of the mosquito any further.

Having attributed such an important function to the flagellum, it may be worth while to consider whether Manson's inferences were justifiable, or whether the flagellum was destined to perform some other duty. In 1895, Sakharov[3] advanced an interesting hypothesis, which was not confirmed until some time later. He believed that he had demonstrated chromatin in the flagella, and that the latter represented the chromatic filaments of the nucleus of the parasite. He held that the process of flagellation represented a modification of karyokinesis, the chromatin filaments breaking loose from the body and appearing as the mobile flagella. This observation has been recently confirmed by Bignami and Bastianelli,[4] who demonstrated conclusively by Romanowsky's stain that certain of the flagella contain chromatin filaments. The demonstration of chromatin in the flagella suggests their similarity in structure and activity to a spermatozoon, and would seem to indicate that they served some purpose in the propagation of the parasite.

The important observations of MacCallum[5] on the *halteridium labbé*, a malarial parasite of birds, showed conclusively what the function of the flagellum actually is. He demonstrated without a doubt that the flagella represent sexual elements. Two forms of the halteridium were observed—one with hyaline and the other with granular protoplasm. Both these forms were seen to eventually leave the red blood-corpuscle. The hyaline form underwent flagellation, whereas this process was never observed to take place in the granular form. Certain of the flagella that tore themselves free from the hyaline forms were seen to rapidly approach and penetrate the parasites with granular protoplasm, and become completely lost in the substance of the latter. From this fertilized parasite an actively motile, conical-shaped organism, identical with the pseudo-vermicule of Danilewsky, was seen to arise. This pseudo-vermicule was very destructive, piercing masses of red blood-corpuscles, thus permitting the hæmoglobin to escape into the plasma and setting the nuclei of the red blood-cells free. MacCallum expresses himself concerning this body as follows: "The result of this fertilization is a motile stage which seems more resistant, and it is thought possible, in view of certain facts, that this form may make its way through the intestinal canal to the external world." Subsequent to this observation MacCallum saw the same fertilization process take place in the blood of a woman suffering from æstivo-autumnal malaria.

As already stated, Ross, up to 1896, had not traced the malarial parasite beyond the flagellate stage in the stomach cavity of the mosquito. With the conviction that the mosquito theory was a promising one, he proceeded to pursue his investigations further. In August, 1897, he[6] found certain peculiar oval pigmented cells in the tissues of the stomach-wall of two dapple-winged mosquitoes fed on the blood of patients suffering from æstivo-autumnal malaria. The pigment was practically identical with that in the malarial parasite, and these bodies were found only in mosquitoes which had fed on the blood of malarial patients. On another occasion similar bodies were found in the stomach-wall of a gray mosquito which had been fed on the blood of a patient with tertian fever.

Thinking that some light might be thrown on the mosquito theory by the study of the blood of birds, Ross,[7] working in Calcutta, proceeded to devote his time to the study of the malarial organisms of birds' blood, and to endeavor to follow their development after being ingested by mosquitoes. He identified the same varieties of parasites as had been previously described by Labbé, Opie, and MacCallum. For his experimental work he used birds infected with proteosoma. After a certain variety of mosquito, which he termed the gray mosquito, had fed on the blood of birds containing mature proteosoma, Ross found that the stomach-wall of the insect always contained on the second day afterward peculiar pigmented bodies embedded in its substance. These resembled coccidia in their structure. The youngest coccidia seen on the second day were small oval bodies 8μ or less in the long diameter; they consisted of a colorable ectoplasm and an indifferent entoplasm, and contained pigment like that of the proteosoma, as well as vacuoles and granules. They grew rapidly and added about 10μ of diameter for every twenty-four hours of their life. A capsule developed, and the pigment, which generally surrounded one or more large vacuoles, gradually diminished in amount until, on about the fourth day, it vanished entirely. From this time the contents of the body became studded with numerous small particles resembling oil globules, and the whole cell began to protrude from the external wall of the stomach into the cœlom or body-cavity of the mosquito. The coccidia continued to grow until, on the sixth or seventh day, the size reached 60 by 70μ. No further development was observed from the seventh to the twelfth day after feeding. Ross noted a peculiar striated appearance within some of the older of the coccidia, while in others there were ten or twelve sausage-shaped structures to be seen. The problem as to how the parasites were enabled to enter the stomach-wall remained to be solved. This must take place within the first twenty-four hours. The observation of MacCallum on the blood of birds infected with the halteridium seemed to afford the necessary explanation. What seemed more natural than that the actively motile pseudo-vermicule, resulting from the fertilization process, should represent the form of the parasite which enables it to embed itself in the stomach-wall of the mosquito. Ross found pseudo-vermicules in the stomach of a gray mosquito killed within an hour after it had fed on a crow with halteridium. Unfortunately for the theory, he failed to observe pseudo-vermicules in the stomachs of mosquitoes fed on birds infected with proteosoma, although, from inference, the same would be expected to occur. In referring to the relation between the proteosoma and the coccidia, Ross says: "Whatever that solution may be, however, there can be no doubt . . . that the coccidia constitute the mosquito-stage in the life history of the proteosoma."

Ross, with commendable enthusiasm, continued his investigations, and added new links in the chain of evidence supporting the mosquito theory. He published his observations in a preliminary report,[8] and they were also presented before the British Medical Association by Manson.[9] Ross observed that there were two forms of coccidia; one contained innumerable thread-like bodies from 12 to 16μ in length and 1μ in breadth, closely packed within the capsule of the mother coccidium; the other contained large black spores, which, when mature, were from 16 to 20μ in length and 2 or 3μ in thickness. On the eighth or ninth day the coccidia rupture and set these "reproductive elements" free in the general body-cavity of the mosquito, which contains the so-called blood or circulating juices. The reproductive elements are swept away by the blood-current and distributed throughout the tissue of the mosquito, as was readily demonstrated by microscopic examination. He found large numbers of the thread-like elements in certain gland cells situated in the anterior part of the thorax. On closer examination these cells were seen to form part of a gland which had hitherto been overlooked by biologists. In Ross' words: "This organ lies in the neck or the anterior part of the thorax of the mosquito, and consists of a number of separate lobes. Each lobe is made up of numerous large cells clustered around a central duct and contained within a limiting membrane. The ducts of the several lobes ultimately unite and form a single main effluent. This runs up the under surface of the head in the middle line, enters the base of one of the stylets or lancets of the proboscis—namely, the central unpaired one, called the tongue or epipharynx—traverses the whole length of it, and opens at its extremity in such a manner that the secretion of the gland must be poured into the very bottom of the wound made by the piercing apparatus of the proboscis.

"It is in the cells of this gland that the thread-like reproductive elements of the proteosoma-coccidia have the power of accumulating. How they manage to enter the cells from the blood I do not know; but it is certain that they can be found in them in large numbers, either floating separately in the grape-like cavity of the cells, or crowded together within them in hundreds. It is impossible to mistake their identity."

Ross believed that this gland represented a veneno-salivary gland, and strongly suspected that the thread-like bodies or "germinal spores" were injected with the secretion of the gland into the bitten bird of amenable species, where they were capable of developing into mature proteosoma, thus completing the cycle of the parasite. This suspicion he proceeded to prove by experiment. He obtained mosquitoes that had fed on proteosoma-infected sparrows, and preserved them for five or six days, until he knew that the germinal rods had formed and were contained in the cells of the veneno-salivary gland. He then allowed the mosquitoes to bite sparrows in whose blood careful microscopic examination had shown there were no proteosoma. He was rewarded later by finding immense numbers of proteosoma in the blood-corpuscles of these bitten birds. Out of twenty-eight originally healthy sparrows subjected to the bite of gray mosquitoes previously fed on diseased sparrows, twenty-two, or 79 per cent., became infected, all with a large number of parasites, in from five to eight days. Of two crows and four weaver birds subjected to the bites of the mosquitoes fed on proteosoma-infected birds, one crow and all the weaver birds developed proteosoma infections within nine or ten days.

Ross was unable to demonstrate what the function of the "black spores" is. His observations seemed to prove without a doubt that in birds infected with a parasite closely resembling the parasite in human malaria the mosquito acts the part of an intermediate host, and also possesses the power of conveying the infection by means of its bite It seemed natural to infer that a similar condition existed in connection with the malarial parasite of human beings, although this still lacked definite proof.

Daniels,[10] working in Calcutta under Ross' supervision, was able to confirm all of the latter's observations. He traced the various stages of the development of the proteosoma in the tissues of the mosquito up to the appearance of the germinal threads in the cells of the salivary glands. He also proved that mosquitoes fed on birds infected with proteosoma were capable of transmitting malaria to birds previously shown to be free from infection. Thus twelve out of twenty-two birds (54 per cent.) became infected. This compares unfavorably with Ross' earlier results, as, in his published series, twenty-two out of twenty-eight (or 79 per cent.) were infected. Ross' experiments, however, were carried out under more favorable conditions. They were undertaken in the summer months, when the parasite develops more rapidly in the mosquito, and at which season the mosquitoes bite more readily and are more easily kept alive. Daniels thinks that it is possible that in the cold season the birds have a greater power of resistance. This view was supported by the fact that the birds which became infected soon recovered from the attack.

Concerning Ross' germinal threads, Daniels says that "They are sickle-shaped bodies, 14 to 15μ in length. They stain with logwood or methyl-blue, but not strongly. On adding water or Farrant's solution they lose their shrivelled appearance and become rounded. Nearer one end than the other is an unstained portion (nucleus ?). They show no signs of movement, but as they are invisible in water, and only become visible when shrivelled by the salt or stained, it may be doubted if they have been seen alive." Daniels found the "black spores" in most of the mosquitoes he dissected. These spores are very resistant. He had seen some which had been kept in water for months by Ross, and which had undergone no visible change. They were very resistant to liquor potassæ. After rupture of the coccidial cysts these black spores are to be found all over the body of the mosquito, but not included within cells. They apparently do not accumulate in any particular organ. According to Major Ross, the most plausible view as to the nature of these black spores is that they are "resting spores," and "that through them, by another cycle, the proteosoma can be propagated in conditions unfavorable for direct propagation by mosquito-insertion into a warm-blooded animal." If this be the case three courses suggest themselves to Daniels:

"(*a*) From the black spores may arise bodies capable of non-parasitic life (and possibly of reproduction), which at certain stages of their existence, and in certain conditions, on introduction into a warm-blooded host by inhalation, through drinking-water, or even by injection by a mosquito or other blood-sucker in transferring them from the medium in which they live, may resume parasitic habits.

"(*b*) That they may be ingested by mosquito larvæ, and in them undergo such development as will result in the formation of germinal threads in the adult mosquito, which, in turn, may be injected into the appropriate bird.

"(*c*) That they may, if swallowed or inhaled by an appropriate warm-blooded host, so develop as to reach the circulation and pass into the sporulating phase."

Koch, Rübner and others have pointed out the intimate geographical association between malaria and the mosquito. Where one is found the other usually also prevails. Koch is very favorably impressed with the importance of the mosquito as an agent in transmitting malaria. He is devoting a great deal of time at present to the study of malaria. It is greatly to be regretted that he has not been more liberal in giving due credit to those who have recently made important observations on the development of the malarial organism. In a late article (*Deutsche medicinische Wochenschrift*, February 2, 1899, pp. 69–70) he refers to the fertilization process already observed by MacCallum, and gives the unsuspecting reader the impression that this was an original observation made by himself.

The Italian* observers were not inactive while Ross was making his important discoveries in India. Dionisi[11] carefully examined the proboscides of mosquitoes, but was unable to find any bodies resembling malarial parasites either in the proboscis or in the drop of saliva frequently present. He determined that mosquitoes do bite birds, and that malarial organisms soon become unrecognizable in the intestinal contents of mosquitoes fed on infected birds. He did not succeed in infecting birds with mosquitoes from malarial districts. He made the interesting observation that the hæmatozoon infections in pigeons occur just at the time of moulting, when they are most readily bitten by mosquitoes.

Grassi[12] made a careful study of the varieties of mosquitoes which prevail in malarious and non-malarious districts, and found that three varieties are constantly present in malarious regions and absent in healthy districts. The association of these three forms of mosquitoes with the existence of malarial infections was so striking and constant that Grassi asserts "That after all the facts which have been stated, all the objections which could be made to the mosquito theory fall, and we may, on the other hand, assert that it explains all the phenomena of malaria." . . .

One of the three varieties of mosquitoes, the *anopheles claviger*, is, it appears, definitely associated, both in the localities in which it occurs and the time at which it bites, with tertian malaria, whereas the other two varieties, the *culex penicillaris* and the *culex malariæ* (a new species so named by Grassi) occur apparently invariably in the localities and at the times of year in which the æstivo-autumnal fevers predominate. Thayer[13] quotes Grassi as follows: "In conclusion, I am of the opinion that the *culex penicillaris* and the *anopheles claviger*, at least the *culex penicillaris*, perhaps also the *culex malariæ*, behave in malaria as does the tick in Texas fever. One must bear in mind that very few paludal gnats and mosquitoes (*zanzere e zanzerone palustri*) can be infected with malarial parasites, and, in fact, the greater part of them bite domestic animals (oxen, horses, hogs, pigeons, hens) and healthy men. It may be, therefore, that a single bite of a paludal mosquito or gnat *(zanzerone o di zanzere palustri)* may cause malarial infection, just as it may be that a myriad of bites may fail to cause it." These statements require modificaton, as will be seen from the subsequent observations of Grassi, Bignami, and Bastianelli.

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* For many of the following points concerning the mosquito and its relation to malaria, I am indebted to Dr. Thayer's recent review of the Italian literature on the subject. Progressive Medicine, March, 1899, vol. i. I have also had valuable assistance from Dr. Thayer in abstracting the recent Italian articles.

Bignami,[14] independently of Grassi, had commenced a series of experiments to determine the possibity of infection of human individuals by the bites of mosquitoes collected from malarial districts. He exposed a patient to the bites of mosquitoes collected from Porto, a malarious district. The mosquitoes were too scanty, and the experiment was continued with two patients in a different manner. The larvæ were collected from the same place, and were allowed to mature in a room into which the patients were subsequently placed. The results were again negative. Benefiting by the experience of Grassi, of which he had in the meantime become acquainted, he secured adult mosquitoes from Maccarese, an intensely malarious district, letting them loose in a room, and allowing an individual to sleep in the same chamber, as a consequence of which he was frequently bitten. The patient was an individual who had never had malaria, and who had lived for six years in the Santo Spirito Hospital, where no case of malaria had ever been known to develop spontaneously. The patient slept in the room from September 26th until the last of October, although at intervals there were but few mosquitoes present. On October 31st he had a slight elevation of temperature; on November 1st a chill, and afterward a remittent fever up to the administration of quinine on November 3d. On the morning of November 3d characteristic æstivo-autumnal parasites were found in the blood. Bignami believed that infection from other sources than from mosquitoes could be absolutely ruled out.

Specimens of mosquitoes from each batch were sent to Grassi for identification. Those mosquitoes hatched from larvæ were in all instances identified as the *culex pipiens.*

From every batch of mosquitoes used in the last experiment (which gave positive results) specimens were sent to Grassi, and among these he found the *culex penicillaris*, the *culex malariæ,* and the *anopheles claviger*—the latter few in number and only in one batch. That is to say, the mosquitoes to which the positive infection appeared to have been due were exactly those varieties which Grassi had found to be associated with æstivo-autumnal malaria.

Bignami proceeds to discuss the question as to whether malaria is contracted by inoculation alone. He believes that inoculation was, up to that date, the only means for which experimental demonstration had been obtained. He says: "I believe it may be safely affirmed that all the facts known up to the present regarding the biology of the parasites allied to those of the malaria, favor the idea that infection is conveyed in only one way and introduced by only one method. . . . To sum up, malaria is a disease which is contracted by inoculation, a fact of which we have now obtained the first experimental proof, since we have seen that an individual who has never had malarial fever, by sleeping in a healthy place where no one had ever previously taken fever, may sicken of malaria of a grave type if bitten by certain species of mosquito brought in the adult state from some distant locality of highly malarious character. Further, everything points to the conclusion that inoculation is the only mode by which infection is acquired, since air and water as carriers of infection may be excluded, and because arguments based on analogy all tend in the same direction. This much, at any rate, we can assert—namely, that inoculation is the only mechanism of infection which has been demonstrated experimentally."

Bastianelli, Bignami, and Grassi,[15] working together, have made some interesting observations upon the cultivation of malarial crescents of man in the *anopheles claviger*. They claim that they have positively followed certain phases of development of these bodies, in the wall of the middle intestine, of several specimens of *anopheles claviger* which had been fed on patients suffering from æstivo-autumnal malaria. The most striking specimens correspond with those described by Ross in his experiments with the proteosoma of birds, and seen on the second and third day. In a room in which there were four patients, all apparently suffering from æstivo-autumnal fever, they collected six specimens of *culex pipiens*, one *anopheles nigripes*, and four *anopheles claviger*. In two of the *anopheles claviger* they found stages of development corresponding to those of the fourth day found by Ross in mosquitoes fed upon proteosoma. They are of the opinion that these mosquitoes are similar to the dapple-winged mosquito of Ross, in which he found stages of development similar to those of the proteosoma of the third day.

They relate the interesting observation that in Lentini, in Sicily, during last October and November, malaria was still prevalent, and the *anopheles claviger* was abundant, while neither the *culex penicillaris* nor the *culex malariæ* were to be found.

They produced a double tertian malaria, as the result of the bite of the *anopheles claviger*, in a man who was certainly not suffering from malaria, and who lived in a non-malarious district.

A number of publications by these Italian observers now followed each other in rapid succession. Grassi, Bignami, and Bastianelli[16] proceeded to study more accurately the phases of development of human malarial parasites in the bodies of mosquitoes. After biting the infected individual the mosquitoes were kept in the thermostat at 30° C., which temperature was found most favorable for the developmental changes of the parasite.

They first studied the development of the æstivo-autumnal organism in the *anopheles claviger* after the latter had fed on infected individuals. They found that cultivation of the parasite in the mosquito occurred only when the semilunar bodies were mature—that is, when they developed into round bodies and flagellate forms. Briefly stated, they traced out all the various stages of the parasite in the tissues of the mosquito which had been previously described by Ross for the proteosoma of birds. The developmental changes were practically identical even up to the finding of the thread-like bodies or "sporozoids" in the cells and ducts of the salivary gland. They noted that the sporozoids were non-motile when present in their capsules or in the cells of the salivary gland, but that they were motile when free in the cœlom of the mosquito.

In specimens of *anopheles claviger* fed on patients with tertian malarial parasites they distinguished pigmented bodies on the outer surface of the mosquito's stomach, and followed the stages of development up to the fifth day.

They observed some important changes in the hyaline cells of the salivary glands of mosquitoes which had fed on infected patients some considerable time previously. These changes were believed to be due to transformations of the thread-like filaments. Some of the cells were filled with round or semi-round bodies. In others these bodies occupied the centre of the cell only. In rarer instances they were found in the tubules. When the cells were ruptured, fusiform bodies, shorter than sporozoids, but thicker and furnished with a nucleus, were seen to escape. In one case they saw in the same cell amongst these short bodies a certain number of filaments or sporozoids, and in one instance these sporozoids were seen to grow shorter and to take on the form of the shorter bodies. Beside the cells containing these round bodies, there were others containing irregular masses of hyaline material. These were found in an *anopheles claviger* which had fed on an infected patient one month before. The longer they waited after the mosquito had bitten a malarial individual, fewer of the round bodies and more of the hyaline masses were found. These changes occur in the æstivo-autumnal infections when there are "gameti" forms (sexually mature forms) present.

They say that the passage of malaria from man to the *anopheles claviger*, and from the *anopheles claviger* to man, has been demonstrated without a doubt. They support the view that there is a hereditary transmission of malaria from the mosquito through its egg.

They conclude: 1. That the hæmosporidia of malaria run in man the well-known cycle of development characterized by the long duration of the amœboid stage and the absence of the encapsulated phase; in this cycle they reproduce themselves an undetermined number of times, and also give rise to forms which remain sterile in man ("gameti" of Grassi and Dionisi). These latter reach the middle intestine (or stomach) of the *anopheles claviger* and develop into sporozoa, which in turn result in the formation of sporozoids. These sporozoids collect in the salivary gland, and reach man again during the act of biting.

2. The development of the hæmosporidia in the body of the mosquito has been demonstrated for the parasites of æstivo-autumnal and ordinary tetrian fever.

3. While the direct passage of hæmosporidia from man to the mosquito, and from the mosquito to man, has been demonstrated, it remains to be yet proven that the mosquito transmits malaria to its progeny, although this is quite probable.

They add that they have found in the well-developed eggs of the mosquitoes certain bodies which may be interpreted as the spores of the hæmosporidia.

Later,[17] these same observers demonstrated that the *anopheles pictus* (dappled-winged mosquito of Ross) was capable of transmitting æstivo-autumnal malaria to man.

In April of this year Bastianelli and Bignami[18] read a most important communication before the Royal Academy of Medicine in Rome on the development of the tertian malarial parasite in the *anopheles claviger*. They refer to the fact that it is much more difficult to cultivate the tertian than the æstivo-autumnal parasite in mosquitoes. This is due to the fact that there are fewer "gameti" in the circulating blood of patients with the former than with the latter infection. By "gameti" they mean those forms of the parasite which do not go on to sporulation in the human subject, and which are destined to continue the life-history of the malarial parasite outside the human body. They bring up an interesting idea. They made out that the crescents, which are the gameti forms for the æstivo-autumnal parasites, develop in the bone-marrow; only the mature forms are found in the circulating blood, whereas the various steps in the development of the crescents can be seen in the bone-marrow. The gameti forms of the æstivo-autumnal parasite are found in large numbers in the circulating blood. In tertian blood the gameti develop entirely in the bone-marrow, and only appear in small numbers in the circulating blood just before the chill. Hence the smaller liability of mosquitoes becoming infected by biting malarial patients suffering from tertian infections.

MacCallum had observed that there were two forms of round bodies in the halteridium, one of which represented the female the other the male organism. Bastianelli and Bignami have found that there are two forms of gameti for the tertian parasite as well, and have designated them by names already in use by biologists. The male forms are called "microgametocytes" and the female forms "macrogameti." By proper staining methods they have been able to study the finer structure of these forms. The nucleus of the microgametocyte is centrally situated and the chromatin is abundant and present in the form of filaments. In the macrogameti the nucleus is larger and situated at the periphery; the chromatin is scarce and occurs in the form of granules. From the microgametocytes the flagella arise. They find that the filaments of chromatin of the nucleus pass out into the flagella, being ensheathed with a certain amount of protoplasmic substance. They designate the flagella by the term "microgameti." It is interesting, that as early as 1895, Sakharow[19] claimed that he had demonstrated that the flagella represent the chromatic filaments of the nucleus of the parasite. His view was generally discredited at the time. They find that four microgameti always develop from the crescents. In the tertian there are usually six or seven microgameti, six being the more common number.

The number of gameti bears a close relationship to the acuteness of the malarial attack. They are most numerous in the first attack and in the first relapse, and less numerous in subsequent relapses.

In studying the sexual behavior of the microgametocytes and the macrogameti, they found instances in which the nucleus of the latter contained a filament of chromatin, presumably due to fertilization of the macrogameti by the microgameti derived from the microgametocyte.

They enumerate various points in which the gameti of æstivo-autumnal differ from those of tertian malaria.

a. In the form of the sporozoon, which is usually fusiform or ovoid in æstivo-autumnal, while it is generally round, exceptionally ovoid, for tertian parasites.

b. In the aspect or appearance of the sporozoon. In the case of the æstivo-autumnal it has a more definite outline and greater refraction, and consequently is well seen even with low powers, whereas in the case of the tertian it is more transparent and less well seen.

c. In the quality of the pigment, which is not identical with that of the parasites of man.

d. In the volume and number of nuclei into which the sporozoon divides. In the tertian sporozoon the nuclei are larger and less numerous than in the æstivo-autumnal.

e. Certain differences also exist in the arrangement of the sporozoids in the capsules of the sporozoon. The sporozoids are more regularly arranged in the capsule of the tertian. They claim that the differences in the disposition of the sporozoids enables one to distinguish whether a mosquito is infected with a tertian or æstivo-autumnal parasite.

They carried out some practical experiments. In one case a man who had never had malaria, and who did not live in a malarious district, developed double tertian fever from the bites of the *anopheles claviger*, examples of which on subsequent examination were shown to contain the encapsulated forms of the tertian type.

In a second case, a patient with æstivo-autumnal malaria was allowed to be bitten by mosquitoes (*anopheles claviger*), and seventeen days later he developed a tertian infection, the æstivo-autumnal dying out. Some of these mosquitoes which had infected the man with a tertian fever were examined, and it was found that encapsulated forms of the æstivo-autumnal type had developed in the stomach-wall. Others were allowed to bite a second patient, who subsequently contracted an æstivo-autumnal infection.

Bastianelli and Bignami then conclude that in tertian fever there are certain large pigmented parasites which are incapable of multiplying in man. These are divided morphologically into two types—the macrogameti, with large vesicular nucleus and small amount of chromatin, representing the female, and the microgametocytes, with more abundant chromatin, representing the male. After mosquitoes suck the blood from a patient with tertian malaria, fecundation takes place in the middle intestine (stomach) by one of the six microgameti fertilizing the macrogameti. After fertilization of the macrogameti the latter contract and enter the stomach-wall, where they undergo the developmental phases as described for the proteosoma by Ross.

They are able to determine readily whether the parasite in the *anopheles claviger* are of the tertian or æstivo-autumnal form. They have demonstrated that the tertian malarial parasite of man is readily cultivated in the *anopheles claviger*, and that this mosquito is capable of conveying the infection to man.

There is now positive experimental proof that two mosquitoes—*anopheles claviger* and the *anopheles pictus*—are capable of conveying æstivo-autumnal fever to man, the former apparently more commonly than the latter. It is also just as firmly established that the *anopheles claviger* is the conveyer of tertian infection. It has been further shown that the infection can be conveyed by the mosquito to man and from man back to the mosquito, thus completing the cycle of development and firmly establishing the mosquito theory.

The mosquito theory having been definitely established, it is only natural that some one should come forward and suggest some practical method for the extermination of the mosquitoes which convey the infection, and thus to wipe out the disease at least in certain localities. Ross,[20] who first gave the mosquito theory a firm foundation by his experimental work, also has the honor of being the first to suggest a means of exterminating the mosquito, the infecting agent.

He now believes that the mosquito is the definitive host, and man the intermediate host, of the malarial parasite. The cycle of development is then analogous to that of the *tænia solium* and the *trichina spiralis*, where swine constitute the definitive host and man the intermediate host.

I quote Ross as follows: "Needless to say we can never hope to exterminate them by catching and killing them individually. But fortunately there is a very vulnerable stage in their career, before they reach their winged condition—that is, when they are water insects—the little wriggling larvæ found in pots and tubs of water, and in stagnant puddles. These larvæ take about a week to mature in the water. When mature they rise to the surface and become the adult winged insect and fly away. The females feed on men, cattle, or birds, and can live for weeks or even months, laying eggs a few days after each meal. Now it is hopeless to attempt their destruction when they are winged, but our knowledge of their life history leads us to suppose that if we could make arrangements to empty out once a week all the tubs of water, the ditches, the puddles, and wells within a given area, we should be able to exterminate the larvæ within that area at least for a time, and therefore, also, we should be able to exterminate, at least to a great extent, the adult mosquitoes."

From his observations in India, Ross found that all the more common forms of mosquitoes belong to the two genera of the zoological family of the *culicides*, namely—genus culex and genus anopheles. The most common species is the culex. The adults have certain characteristics which readily distinguish them. Their eggs are laid on the surface of artificial collections of water, such as pots and tubs of water, cisterns, wells, and drains. The larvæ, so far as he has observed, float head downward when resting on the surface of the water. The genus culex is extremely common in towns and villages.

Mosquitoes of the genus anopheles differ morphologically from those of the genus culex, and are most common in the rural regions. Their larvæ are scarcely ever to be found in artificial collections of water, but only in natural ponds and puddles. Consequently they are much less common in towns and more frequent in the country. Their larvæ do not float head downward, as is the case with the culex, but float flat on the surface of the water like sticks, an important difference—due to the absence of the breathing tube in anopheles—which enables one to distinguish the larvæ at a glance, and consequently the pools in which they breed. Ross found that it was difficult to obtain larvæ of the anopheles. The reasons for the scarcity of the larvæ of the anopheles appeared to be that the puddles (*a*) must be large enough to be permanent for a few days, to allow the larvæ to mature; (*b*) must not be so large as to contain minnows (which devour the larvæ with avidity); and (*c*) must not be liable to be scoured out by every shower of rain.

The interesting point is that up to the present only mosquitoes belonging to the genus anopheles have been found to contain malarial parasites, and to possess the power of transmitting the disease. Ross states that if future experiments show that malaria is confined to the genus anopheles the task will be much simplified, and there would be a chance of exterminating the whole genus, at least in a given locality. This would be done by attacking the larvæ, which, as already stated, can be readily recognized in the breeding-pools.

Ross is of the opinion, from the evidence at hand, that there are good prospects of annihilating the *anopheles claviger*, and, consequently, also malarial fever, in a given locality, by removing their natural breeding-pools and preventing their reformation.

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REVIEWS.

VACCINATION, ITS NATURAL HISTORY AND PATHOLOGY. Being the Milroy Lectures for 1898, delivered before the Royal College of Physicians of London. By S. MONCKTON COPEMAN, A.M., M.D. Cantab., M.R.C.P., London. Pp. 257, xii. plates. New York: The MacMillan Company, 1899.

THE chief object of the preparation of these lectures and their publication in a volume was, as stated by the author, to review the accretions to our knowledge on the subject of vaccination, more particularly from the stand-point of pathology, and to direct attention to certain changes in the regulation and practice of vaccination which have obtained during the century following Jenner's discovery. While it is questionable whether any real improvements during this time have been added to the principles taught by Jenner, excepting, of course, the application of antisepsis, which was unknown in his day, yet in reading the book one could not fail to be interested and instructed in the account it contains of the history of smallpox, the relationship of variola and vaccinia, the history of various vaccine lymph stocks, animal vaccination, and glycerinated lymph. An appendix is added containing an elaborate description of the preparation and storage of glycerinated calf-lymph incerta in European countries. Also in an appendix, as well as in other parts of the book, may be found an interesting account of all that is known at the present time concerning the bacteriology of vaccine lymph.

Before the discovery of vaccination no disease was more common, more fatal, nor more dreaded than smallpox. As the author truly says, it would be difficult to give a more vivid illustration of the state of affairs previously existing than are given by Macaulay when he said "That disease, over which science has since achieved a succession of glorious and beneficent victories, was then the most terrible of all the ministers of death. The havoc of the plague had been far more rapid, but the plague had visited our shores only once or twice within living memory, and the smallpox was always present, filling the church-yards with corpses, tormenting with constant fears all whom it had not stricken, leaving on those whose lives it spared the hideous traces of its power, turning the babe into a changeling at which the mother shuddered, and making the eyes and cheeks of the betrothed maiden objects of horror to her lover."

It is not easy to estimate very accurately in populous countries the ratio of deaths to the living population during the prevaccination age, since epidemics followed each other in such rapid succession that at each reappearance of the disease very many persons enjoyed immunity by reason of a previous attack. In order to illustrate the full effects of an epidemic of smallpox when not thus hampered by a general immunity, the author cites the case of Iceland, which, owing to its isolated position, escaped an invasion until the years 1707-1709, when, out of a total population of 50,000 not less than 18,000 persons died of this disease.

Previous to the discovery of Jenner, it was noticed in England and in other countries where epidemics were frequent that smallpox was to a great extent a disease of childhood. This was not because children were naturally more susceptible, but because a large proportion of the older persons had already had the disease. In certain epidemics which occurred in various parts of England during the eighteenth century it is recorded that the vast proportion of deaths was contributed by children under ten years of age. The author refers to epidemics at Warrington and Chester, in 1773 and 1774, in which not a single death occurred in a person above that age; while of the 202 deaths at Chester, one-quarter of this number were infants under twelve months. Instances of like results are mentioned in the final report of the Royal Commission on Vaccination, one particularly, in which only 7 deaths out of a total of 622 occurred in persons above the age of ten years. It should be stated that these figures embrace the aggregate of the deaths of several epidemics which occurred between 1729 and 1763. Reference is also made to the burial registers of the grave-yards of St. Cuthbert's, Canongate, and Buccleuch Street, Edinburgh, which show that during the years 1764 to 1783, of every 1000 deaths from smallpox, at all ages, no less than 993 were of children below ten years of age.

This condition of affairs has been entirely reversed by vaccination. Whenever epidemics occur to-day in civilized countries the vast majority of deaths are contributed by persons above the age of ten years. Dr. Gregory, after an experience covering a period of twenty years as Physician to the Smallpox Hospital of London, and including over 6000 cases, says he never saw more than three or four cases of varioloid in vaccinated children under eight years, and these recovered. It has been estimated that children under five years, including the unvaccinated, now supply only 3.07 per cent. of the deaths from smallpox, and adults of from twenty to sixty years of age, 77 per cent. Mortality from this disease among well-vaccinated children under ten years old is exceedingly rare, so that practically all the deaths that occur within this age-limit must be accounted for by the unvaccinated. These statements could be supported by additional statistics did space permit.

Jenner was mistaken when he said that the protection from vaccination was permanent, or, at least, as much so as a previous attack of smallpox. Nothing but long experience could determine this, and we now know that after efficient vaccination in infancy there is, in the majority of persons, a gradual progress from safety toward danger as time elapses, particularly when the age of puberty is passed, so that in order to maintain protection it is necessary to revaccinate once, if not oftener, after the period of childhood.

The value of revaccination is attested by incontrovertible evidence. But for vaccination and revaccination the percentage of physicians who take smallpox would be vastly greater than it is, for they are much more exposed than other people. In smallpox hospitals the physicians, nurses, and attendants rarely, if ever, contract the disease if they are careful to be revaccinated before being assigned to duty. Dr. Gayton, of London, says that at the Smallpox Hospital in 1871 to 1877, out of 366 people employed, all but one were revaccinated, and that one took smallpox. Marson, in his connection with the hospital for thirty-six years, saw no nurse or attendant attacked, all being protected by revaccination. Other smallpox hospitals have reported the same experience. Apart from hospitals, Prussia furnishes the strongest proof of the efficacy of this protective agent. In that country vaccination has been required, and revaccination made compulsory in the army since 1834. The school children must be vaccinated, and, at a certain age, revaccinated. As a result the mortality from smallpox has been reduced to seven per million of the population, and there has been no mortality from that disease in the army for many years. Revaccination is therefore such an essential part of vaccination that it would seem impossible to write a book on the latter without considering the former, and yet the author has not discussed at all the question of revaccination.

The book, however, will be highly valued for the very full and complete description it contains of the preparation and advantages of glycerinated lymph. The author's researches on the effect of glycerin in purifying vaccine lymph were already well known from his previous publications. He claims to have demonstrated conclusively that by the admixture of calf-lymph and pure glycerin, and storing the mixture under conditons which exclude light and air, the extraneous organisms in the lymph gradually diminish, and by the end of four weeks entirely disappear, leaving the specific vaccine principle unimpaired. The micro-organisms most commonly found in calf-lymph, if not collected at too late a period, are the staphylococcus aureus, albus, cereus albus, and cereus flavus. The streptococcus of pus is said to be only rarely found. With reference to the question of the possible presence of the tubercle bacillus, the author is not aware of any authentic account of its having been found in vaccine lymph from any source whatever. His experiments, however, show that when large quantities of virulent cultures of tubercle bacilli were purposely added to glycerinated lymph they were effectually destroyed after a period of from four to six weeks. In like manner the streptococcus of erysipelas, if present by accident, yields to the germicidal action of the glycerin. As the bovine animal is not subject to syphilis, the danger of inoculating that disease by the use of calf-lymph may be entirely eliminated. If, therefore, the claims regarding the bacteriological purity and clinical activity of glycerinated lymph are supported by further investigation and experience, this preparation will certainly supersede all other forms of vaccine virus. But until its superior value is clearly demonstrated by experience, the older methods of collecting and preserving lymph should not be wholly abandoned. We have several times seen excessively sore arms from the use of glycerinated lymph prepared in this country—much sorer, indeed, than were ordinarily seen years ago from the use of long humanized virus. This does not seem to be in accord with the claims of the bacteriological purity made for glycerinated lymph. As to its increased clinical activity over bovine lymph preserved on ivory points there is no question.

The author undoubtedly deserves great credit for his original work in the matter of preserving and purifying vaccine lymph. The account he has given of this investigation alone will secure for the book a warm welcome by every student of vaccination, as well as every propagator of bovine lymph. W. M. W.

LEHRBUCH DER NERVENKRANKHEITEN. Text-book of Nervous Diseases. By PROF. DR. H. OPPENHEIM, Berlin. Second edition. Pp. 975; 287 illustrations. Berlin: S. Karger.

DISEASES OF THE NERVOUS SYSTEM. By DR. LUDWIG HIRT, Breslau. Translated by DR. AUGUST HOCH from the second German edition. Pp. 700; 181 illustrations New York: D. Appleton & Co.

AMERICAN SYSTEM OF PRACTICAL MEDICINE. LOOMIS-THOMPSON. Vol. IV. DISEASES OF THE NERVOUS SYSTEM, MUSCLES, AND DYSCRASIÆ. Pp. 1100, illustrated. New York and Philadelphia: Lea Brothers & Co.

NERVOUS AND MENTAL DISEASES. By ARCHIBALD CHURCH, M.D., Chicago, and FREDERICK PETERSON, M.D., New York. Pp. 843; 305 illustrations. Philadelphia: W. B. Saunders.

WITH these four large volumes fresh from the minds of their respective authors, and from the printing-presses of this country and Germany, the inquiring student of neurology and the practitioner of medicine seeking light cannot complain that there is dearth of effort to satisfy their respective requirements. Never before has there been such prolificness in the manufacture of neurological literature. When it is remembered that the past five years have not been particularly fruitful in adding to our knowledge of the natural history of nervous diseases, their causation and treatment, this evidence of breathless activity is not easy to understand. Happily, it is not our duty to interpret the reason for a book's existence, but to give a personal estimate of its worth, to state its claims for recognition by workers in the same field, and to seek for qualities in it that may commend it to the practitioner of medicine. From this point of view the task before us is not a difficult one.

Of the four volumes above mentioned, the two first named—made in Germany—are already well known in this country, especially to teachers and neurologists. On their original appearance it was generally conceded that they merited the praise which was given them unstintingly, both at home and abroad. Were it not for purposes of contrast with the home products further consideration of these volumes might be dismissed by saying that the changes made in these editions have brought them well up to the date of their respective publications. It may be truthfully said that it would be scarcely possible at the present time for anyone to make a text-book of neurology along the same lines and within the same compass superior in its presentation of the facts, more accurate and true in its delineation of disease, and more trustworthy in its directions for treatment than the Lehrbuch of Oppenheim. It has its imperfections and omissions, but they are so enormously overshadowed by its possessions that we refrain from mention of them. The chapter on meningitis is scarcely an accurate and complete reflection of what is known of this affection to-day. Deserved praise is accorded it by saying that it compares most favorably with the treatises of Gowers, Dana, Mills, and Grasset.

Hirt's volume commends itself particularly for its faithful portrayal of the anatomy of nervous diseases and its graphic descriptions of the symptomatology. The handiwork of the indefatigable student, the keen critic, and the broad-minded physician abreast of the progress of the work in his chosen field is evident in every chapter. It is a book that appeals far more to the teacher and student of neurology than to the undergraduate student and practitioner of medicine. Its most striking shortcoming as a text-book lies in the wholly inadequate consideration which it gives to the causation of nervous diseases. It is to be regretted, likewise, that we do not always find it a sufficient and safe guide in the treatment of nervous diseases. In support of this statement we may cite a specific example—the treatment of exophthalmic goitre. Fully apprised from personal experience and knowledge of the experience of others of the results which follow surgical interference in the treatment of this disorder, we demur to the statement that "The most important part of the treatment is total or partial removal of the thyroid gland." Total removal constitutes malpractice, and it is not vouchsafed any man to say just how much permanent benefit will follow partial removal in every case. Not one word is said about the necessity of plan and precision in the treatment of this neurosis, or of the use of aconite, restoratives, and rest in bed, which the reviewer, in common with many other therapists, can state, from no inconsiderable experience, are of greater service in the treatment of this strange disease than any other measures. We desire not to lay ourselves open to the charge of hypercriticalness in selecting one subject for disapproval. We might as well have taken the author's paragraphs on the treatment of sciatica or tic douloureux, which are wretchedly and wholly inadequate. To-day it is generally conceded that more can be done to add to the usefulness and comfort of patients with locomotor ataxia by methodical and persistent use of the Fraenkel method of purposeful exercises than by any other measure. Yet not one word of reference to this method is there in this volume. These shortcomings of Hirt's book may be accounted for in a measure by the fact that the material of the book in the present form left the author's hand (we surmise) in 1894. But as 1899 is printed on the title-page, it might naturally be inferred by him who reads while running that the book is new, or at least has been carefully revised. It is a matter of great regret that the author did not revise his book and bring it in all parts up to date before this American publication. The book has so many qualites to commend it that we are loath to say that in its present form we cannot recommend it to students and practitioners as an adequate consideration of nervous diseases.

The fourth volume of the Loomis-Thompson system, which is taken up largely with the consideration of nervous diseases, maintains the high standard of its predecessors and merits similar approbation. Were all of its chapters as meritorious as some, this volume would rank as one of the most commendable and trustworthy expressions of the status of neurological teachings at this time. Unfortunately, the work of the twenty-four contributors is very uneven. Some of them, apparently, had a fitting realization of what was expected of them, and did their work very well. Others, from lack of training, inclination, or ability, did their allotted share very badly. Then there are not a few of the contributors whose productions fluctuate from one pole of this estimation to the other. In the first category particular mention should be made of the chapters on the "Diagnosis and Localization of Spinal Cord Diseases and Anterior Poliomyelitis," by Dr. M. A. Starr. They are a credit to the author, and they enhance the value of the book; of the chapters on the "Diseases of the Membranes and Bloodvessels of the Spinal Cord," by Dr. C. A. Herter, which bear the imprint of much original thought, of careful preparation, and of scientific statement; of the article on "Neurasthenia," by Dr. J. J. Putnam, which is a credit to American neurology; and of the article on "Arthritis Deformans," by Dr. William G. Thompson, one of the best, if not the best, in the English language. As for those constituting the second category, we shall spare ourselves the pain of mentioning them. Fully realizing the immense labor which must be expended in editing a system of this sort, and aware of many of the obstacles in the way of its successful issue, we might easily be persuaded to say nothing of the choice of some of the subjects and of the space devoted to others in this volume. There are, however, one or two things which we believe to be errors of judgment on the part of the editors. To illustrate our meaning, we take the article on "Sexual Psychoses," by Morton Prince, M.D., an article with the title and matter of which we have no fault to find. But what reason can be offered for devoting twenty-one pages to the discussion of a subject with which the medical student and medical practitioner (unless he happens to be an asylum physician) have practically no concern. The average practising physician will probably not be called upon once in a lifetime to minister to the needs of this class of people. Therefore, we are of the belief that space spent in the discussion of such a subject as this in a volume intended for students and practitioners of medicine is thrown away, and life's handicap increased by having to wade through so much disgusting literature. Contrast this with the discussion of the relation of syphilis to disease of the nervous system, which is surely one of the most momentous questions that offers itself to the practising physician, and one that he has to attempt some solution of almost daily. Yet this subject receives scarcely any consideration in the volume before us. Or, contrast it with the subject of "Sciatica," which is discussed most indifferently and with entire inadequateness. We regret that space was offered in this series for the discussion of the subject of sexual perversion, for we are of those who believe that the physician has less call to concern himself with it than the priest or the socialist. Indeed, in the vast majority of cases it comes more within their province than within ours. Before taking leave of this volume, we desire to say that, taken all in all, it is one of the best composite medical books that have so far been produced. It compares most favorably with Allbutt's *System of Medicine*, which is contemporaneous, and practically of the same scope. If we were called upon to decide between the two, we should favor the Loomis-Thompson system, national prejudice being put aside.

The volume of Church and Peterson is not the joint work of two authors. It consists in reality of two monographs under one cover. Dr. Church is the author of the part devoted to nervous diseases, while Dr. Peterson has written the section on psychiatry. Each part, therefore, bespeaks separate consideration. It is difficult to make an estimate of the worth of Dr. Church's contribution, reviewed from the standpoint of the student and the neurologist. It is no easy matter even for a master of style and an adept in brevity and compression to encompass within 600 pages an adequate and reliable presentation of the subject of nervous diseases. We cannot say that the author has succeeded in doing so. There is ample evidence in every chapter of wide reading and large clinical experience, but at the same time there are far too many evidences of haste in construction and of lack of proper pruning. Naturally, we do not expect the polish of an Addison or the directness of a Clifford in a medical text-book, but there is really no excuse for the repeated use of involved sentences. The following may be taken as an example (the author is describing the gait in the paraplegic state, a paradox in itself): "The pelvis is tilted to the opposite side, and the limb is then brought or dragged to a position under the centre of gravity like a rigid pendulum. It may even be aided by the hand. As it advances it is shaken by clonic movements, and when planted these may cause it to execute several dancing steps before it is securely placed, during which the heel is forcibly elevated and the patient may be bodily jostled up and down. In nearly every respect the gait is the opposite of the steppage of multiple neuritis."

This may have a definite meaning to the writer, but it has none for us. That we may not be thought to have sought out a particular page or sentence, we quote at random from another page in the description of the symptoms of caisson disease: "The disturbance varies in intensity from slight giddiness and neuralgic pains to cross myelitis." While this may be taken as an example of looseness of statement: "Various springs and watering-places have gained a reputation in the treatment of the sciatic neuritis. All furnish hot baths and much rubbing or rude massage."

There is nothing particularly new in the arrangement of the book, and what is does not especially commend itself. For instance, placing the diseases of the coverings of the brain (called the cerebral meninges) and of the cranial nerves together to form Part I. cannot possibly be of advantage. No more can the classification of hæmatomyelia, myelitis, thrombotic softening of the cord, the paraplegic state, and tumors of the cord and its envelope in a separate chapter labelled "Indiscriminate Spinal Cord Lesions." Why such conditions, which are anatomically, clinically, and therapeutically so unlike, should be jostled together in one chapter is difficult to understand. The author's classification of the muscular atrophies into progressive muscular atrophy, due to lesion of the spinal gray matter, and progressive muscular atrophies not marked by striking histological cord lesions, and their consideration under "Lesions and Disease of the Spinal Gray," does not seem to us consistent with the status of our knowledge of the muscular atrophies and dystrophies, imperfect and inadequate as it is.

In truth, we find ourselves in an uncomfortable predicament in being called upon to review this book. We cannot truthfully say that it merits the approbation that a number of American text-books on neurology have received within the last ten years. It contains the materials for a first-class book, but there are too many evidences of immaturity and haste and lack of deliberation for it to receive favorable consideration. Altogether, the best part of Dr. Church's work is that devoted to the eliciting of the patient's complaint and to the examintion.

Dr. Peterson's contribution is contained in the last 200 pages of the volume. It is a straightforward, full, up-to-date consideration of the subject of insanity and idiocy, which will meet the requirements of the student and general practitioner. We prophesy that it will find the favor with them that it deserves. The author avoids the pitfalls of so many writers on insanity who waste their substance on classifications and dissipate their mental energies on definitions. He considers the subject under the eight following heads: Mania, melancholia, circular insanity, epileptic insanity, dementia, general paresis, paranoia, and idiocy. The chapter on the general etiology of insanity is the best in the book; the chapter on paralytic dementia the poorest. In the former the author has given the results of his own work, much of which has been original, supplemented by a careful presentation of the work of others. The same cannot be said of the latter. The chapter on paranoia is extremely commendable. The entire volume is illustrated by a series of photographs, most of them original with the author, which add materially to the value of the book. J. C.

OCULAR THERAPEUTICS. By F. W. OHLEMANN, M.D., Minden, Germany. Translated and edited by CHARLES A. OLIVER, A.M., M.D. Philadelphia: P. Blakiston's Son and Co., 1899.

IT is a well-recognized fact that the longer one is engaged in prescribing remedies the fewer drugs are employed. Works like the one before us tend to prevent this in a measure, and serve to recall to the attention of the practitioner many excellent drugs and procedures which have been permitted to fall into disuse. The author has collated a remarkably large number of formulæ, and has arranged them in a manner which is very convenient for reference.

In the ordinary text-books it is quite impossible to mention other than the remedies which are usually employed in combatting each disease, so that when these fail to accomplish a cure the practitioner is often at a loss for further expedients. It is then that Ohlemann's work will be appreciated, for one will find there a great variety of methods which have been prepared for the treatment of every form of ocular disease. The task of the American edition has been very well performed, and the book will undoubtedly be a valuable adjunct to every ophthalmologist. W. C. P.

A PRACTICAL HAND-BOOK ON THE MUSCULAR ANOMALIES OF THE EYE. By HOWARD F. HANSELL, A.M., M.D., and WENDELL REBER, M.D. Twenty-eight illustrations and one plate. Philadelphia: P. Blakiston's Son & Co., 1899.

THIS monograph is undoubtedly one of the most important which has appeared in ophthalmology for some time, as it is the first to treat of the eye muscles from a clinical stand-point, and may be said to reflect the opinions which are held by the more conservative ophthalmologists of the country upon this much-mooted subject. It is a source of gratification, therefore, that such a work has been penned by Americans, as our countrymen really inaugurated and perfected the treatment of errors in the muscular apparatus of the eye. One must confess to a great feeling of relief, also, to find that the subject so often contorted and exaggerated elsewhere has been treated in a thoroughly dispassionate yet masterful tone.

After a sufficient and satisfactory description of the anatomy and physiology of the external muscles of the eyeball, the authors devote the main portion of their monograph to the consideration of functional anomalies of the eye muscles, and give copious but succinct accounts of the different methods and apparatus employed in the detection and estimation of insufficiencies. It is here that the ophthalmologist, expert and tyro as well, will find an exposition which will force the conviction upon him that a case is but half studied if the proper estimation of the muscular condition has been neglected. W. C. P.

RETINOSCOPY IN THE DETERMINATION OF REFRACTION AT ONE METRE DISTANCE WITH THE PLANE MIRROR. By JAMES THORINGTON, M.D. Third edition, revised and enlarged. Forty-three illustrations, twelve of which are colored. Philadelphia: P. Blakiston's Son & Co., 1899.

To one skilled in its use, retinoscopy is such a rapid and accurate method of determining the refraction of the eyes that it is not strange that two editions of this excellent brochure have been already exhausted. The author is one of the best known exponents of the test, and his teachings, so well expressed in the text-book before us, should enable one to gain a clear idea of this essential of ophthalmology. W. C. P.

PROGRESSIVE MEDICINE. A Quarterly Digest of Advances, Discoveries, and Improvements in the Medical and Surgical Sciences. Edited by H. A. HARE, M.D. Vol. ii., June, 1899. Philadelphia and New York: Lea Brothers & Co.

THE second volume of this quarterly is taken up with the discussion of the surgery of the abdomen, including hernia, by Dr. William B. Coley; gynecology, by Dr. John G. Clark; diseases of the blood, diathetic and metabolic disorders, diseases of the spleen, thyroid gland, and the lymphatic system, by Dr. Alfred Stengel; and ophthalmology, by Dr. Edward Jackson.

Dr. Coley presents his views of the subject in 140 pages. Thoroughness and completeness are its distinguishing features. Particular reference must be made to the illustrations, many of which are equal to those of the most recent books on surgical technique. Dr. Clark's contribution is presented in a little more than 100 pages. One of the most commendable features of this review is the discussion of the influence of castration upon the female constitution. The review of the diseases of the blood and of the ductless glands are handled in a way that leaves nothing to be desired. Leukæmia and diabetes mellitus particularly receive most extensive consideration. The advances in ophthalmology take up 80 pages, and constitute an adequate presentation of the subject. Altogether, the second volume of this series is fully deserving of the merited praise awarded to the first, and the series will no doubt receive wide-spread recognition from the general practitioner and specialist, to both of whom it must prove of great service. J. C.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Primary Carcinoma of the Pancreas.—The difficulty of diagnosing cancer of the pancreas is emphasized by the following case: In September, 1896, a retailer, aged fifty-seven years, complained of feeling tired and weak; he had a constant pain in the loins, and often in the right hip, which radiated to the posterior surface of the thigh; he also had lost some weight. He was a drinker, but without objective signs of alcoholism. In the winter of 1886 he had a severe diffuse bronchitis lasting several weeks. In the fall of 1893 he had repeated rheumatic pains in the back and both legs. There was no hereditary taint. The skin was of a dirty gray color, dry and inelastic. On the mucous membrane of the lower lip was a dark blue spot, about the size of a pinhead.

Nothing of importance was found in the examination of the thorax. The edge of the liver could be felt on deep breathing. The spleen could not be palpated. The urine was always free from albumin, sugar, and bile. Fat was never found in the stools. The patient vomited once, as a result of indigestion, the vomit containing free hydrochloric acid. From the above data the author made the diagnosis of probable Addison's disease. During August, 1897, the patient had repeated attacks of severe cardialgia, which caused the author's colleague to think of gallstones. Within two years the patient lost forty-three pounds. The skin became dirty yellow in color, so the diagnosis of Addison's disease was given up and replaced by that of occult cancer. The pain in the back continued, but the epigastrium was never sensitive. A tumor could never be felt. The appetite was always good. Death occurred July 21, 1898, with signs of extreme exhaustion. The important findings at the autopsy were chronic catarrh of the stomach and a primary carcinoma of the head of the pancreas about the size of the fist. The tail of the pancreas was likewise carcinomatous, yet the structure of the gland was in part recognizable. The tumor was close to the stomach, but had not attacked it. It was adherent to the liver. The retroperitoneal and mesenteric glands were as large as hazel-nuts, and were carcinomatous. The intestines, liver, spleen, kidneys, and adrenals were free from cancer. There were no gallstones. The microscopical examination proved the growth to be scirrhous. In the abdomen the growth lay behind the left lobe of the liver and the stomach, so that it was impossible to feel a tumor until these organs were removed. Since there was neither excess of fat in the stools nor signs of compression, cancer of the pancreas, a rare primary tumor, was not considered. Nor was there sufficient evidence for a diagnosis of cancer of the gall-bladder or stomach. The intestines were excluded as the seat of growth, since no tumor could be felt. There were no signs of stenosis, such as difficulty in defecation or the passage of blood or mucus. A diagnosis of cancer of the pancreas should have been made, first by exclusion, and secondly because a secondary neoplasm in this organ is quite common. As a rule (Strümpell), the head of the pancreas is the portion involved. In fifty-seven cases the head was involved in thirty-five (Madelung.) Willigk, in 467 autopsies on cancerous subjects, found only twenty-nine in which the pancreas was diseased. The tumor may compress the stomach, small intestines, vena porta, vena cava, gall-duct, and the neighboring nerve plexuses, causing severe cardialgia. In Rahn's case the cardia was compressed, causing a dilatation of the stomach. Récamier reports a case in which the tail of the pancreas was involved, causing compression of the left ureter and left-sided hydronephrosis. Pehl's case pressed the stomach against the anterio-abdominal wall, causing symptoms of incarceration. A differential diagnosis between cancer of the pancreas, stomach, and omentum is possible. Friedrich and Strümpell have often failed to find fat in the stools of patients who had extensive cancers of the pancreas. In Da Costa's thirty-seven cases there was vomiting twenty-two times as a result of simultaneous disease of the stomach, jaundice twenty-four, indigestion twenty-five, dropsy fifteen, and severe epigastric pain thirty-two times.—*Münchener med. Wochenschrift*, 1899, No. 5.

Tuberculous Meningitis.—WAIBEL (*Munchener med. Wochenschrift*, 1899, No. 5) describes a case of this disease which is of unusual interest and importance because of its medico-legal bearing. The District Court called for expert testimony as to whether tuberculous meningitis could be caused by trauma. March 4, 1898, a school-girl was struck upon the head by a companion so severely that everything looked black before her eyes, and the left ear became red and swollen. Although the child had always been previously healthy, she complained of severe pain in the head, but continued to go to school. On the third day after the injury, toward evening, the child vomited three times and took to bed. Previous to the injury the child had always been cheerful and lively, but from the day of the blow she became depressed, and moaned and wept frequently. At times the patient complained of pain in the head, especially in the forehead. With the exception of weakness and constipation, examination revealed nothing on which to base a diagnosis. On March 13th the expression was dull, and there was a peculiar brilliancy in the eyes. The color changed frequently, the pulse was normal, the temperature 38.5° C.; the lungs and spleen were normal. On March 14th the mind was cloudy, and the child groaned and shrieked frequently, and complained of a very severe pain in the head. The heart was frequently irregular, at times intermittent, and the breathing was somewhat irregular. The pupils were normal, and the temperature 38.5° C. On this date a diagnosis of meningitis, with a bad prognosis, was made. On March 15th the patient was weaker, still conscious, but apathetic and without rigidity of the neck. This condition continued with variation till the 23d. The temperature gradually increased to 39° C.; the abdomen became scaphoid, the pulse was at times regular, then irregular, and again intermittent and moderately infrequent. The breathing was more irregular, being at times superficial and rapid, then very deep. The consciousness was tolerably undisturbed. From March 24th the child became much worse, remaining entirely unconscious for hours; there was slight convulsive spasms in the extremities, and the child frequently grasped at the air and picked at the bed-clothes. The legs showed slight spastic symptoms; the pupils were often larger than normal and unequally dilated; the eyes frequently turned upward. During the last few days there was almost entire unconsciousness, the pulse was very rapid and small, the patient dying March 30th, twenty-six days after the injury. The autopsy findings were as follows: The meninges were congested, the posterior veins especially being markedly filled. In both lateral ventricles there was a large amount of clear fluid, causing distention. The meninges at the base were infiltrated with a gelatinous exudate, and showed very small miliary tubercles, especially numerous along the course of the vessels. The convolutions were somewhat flattened. The lungs were markedly distended, and showed rather numerous gray tubercles on the clear red cut surface. The bronchial glands were as large as hazel-nuts, with cheesy, yellow tuberculous masses throughout, partly softened in the centre, so that a small cavity could be seen. The heart and abdomen were negative.

The author considers the bronchial glands as the primary focus of the disease, from which the meningitis and general tuberculosis developed, and thinks that the trauma produced a disturbance of the brain and the chest which made it possible for the tubercle bacilli to enter the neighboring blood and lymph vessels, and be carried over the entire body, especially to the brain, and there grow. The following points favor the traumatic origin of the disease in this case: 1. The child was previously healthy, without emaciation, cough, headache, fever, or changes in its disposition. 2. From the moment of injury she complained of headache, dizziness, and weakness, and three days later vomited and had disturbances of sleep. From this time the symptoms appeared and increased in severity. 3. According to the experiments of Koch and Baumgarten tubercles in the brain and other organs require about ten to twelve days for their growth. In the present case the first severe brain symptoms appeared on the tenth day of the disease. 4. A number of similar cases of traumatic brain tuberculosis have been observed and reported. The author and a medical committee from the University of Munich testified that they believed the disease was in this case caused by the trauma, but that there was no conclusive proof, as there is no characteristic difference between a tuberculosis meningitis caused by trauma and the spontaneous variety.

Insufficiency of the Heart Muscle.—MARTIUS (*Klin.-therap. Wochenschrift*, 1899, No. 16), in a thoughtful paper on this subject, describes the following varieties: 1. Pure acute insufficiency of the heart-muscle as the result of over-work or over-exercise. This occurs more easily in untrained persons, but even the heart of the trained man has its limits. Acute strains of a healthy heart rapidly recover under rest, but oft-repeated strains lead to permanent weakness. In such cases the contrast between the forcible apex-beat and the weak pulse is characteristic. 2. The acute heart-muscle insufficiency which forms the essential and primary cause of paroxysmal tachycardia. The enormous frequency of the pulse is secondary. The sudden disappearance of the cardiac dilatation is followed by the disappearance of the apex-beat, and a slowing with increased force of the pulse. The contrast between apex-beat and pulse appears and ceases with the attack. 3. Henschen has called attention to a dilatation occurring in young, weak, and anæmic girls as the result of over-work, but which develops slowly, remains long, and serves to assist in the production of dilatation as the result of relatively trifling causes. Loss of energy, palpitation, dyspnœa on exertion, headache, and loss of appetite are common symptoms, and gastric ulcer and severe anæmia possible consequences. 4. Cardiac weakness, with dilatation, occurs in children as the result of primay insufficiency of the heart-muscle. It occurs in weak and predisposed children without demonstrable cause. Though G. See described this as "hypertrophie cardiaque resultant de la croissance," other French clinicians have recognized that hypertrophy is not a feature of such cases, but that there is really temporary dilatation. Scrofulous children are especially predisposed, and the demands of school-life may be the exciting cause. The children are pale, weak, have loss of appetite and headache, and learn with difficulty. Moderate anæmia, and at times albuminuria are present. Various degrees can be recognized clinically. Highly characteristic is the effect of exercise on the heart in such cases. Climbing stairs may send the pulse up from 80 to 96 to 120 to 140, the objective palpitation increases and the radial pulse becomes impalpable. In severe cases the apex-beat may reach the anterior axillary line. 5. In adults alcohol is the most important predisposing cause, though in this, as in other cases, the effects vary in different individuals.

Malignant Struma, with Severe Hemorrhage from Varices of the Œsophagus.—HELLENDALL (*Deutsche med. Wochenschrift*, 1899, No. 14) reports the following case: The patient, a woman, aged fifty-eight years, had a small goitre since the age of five. During the last six months the tumor grew rapidly, and she vomited blood very frequently. On the first occasion, in the course of three to four hours, she vomited ten washbowls of blood, which at first was dark—later clear red. During the past two months there was swelling of the legs and slight attacks of nocturnal dyspnœa. The patient was very cachectic, markedly cyanotic, and dropsical. On the left leg there were calcified varices. On the anterior surfaces of the neck and thorax there was a large tumor, which extended from the larynx down to the xiphoid process, to the right of the sternocleido muscle, and to the left to the posterior neck muscles, reaching almost to the spinal column. The surface was nodular and covered with large and small dilated veins. The skin was adherent but not ulcerated, and there were no pulsations. The tumor was of moderately hard, elastic consistence, except at the root of the mamma, where fluctuation could be felt. It was closely adherent to the tissues beneath. The pulse was moderately rapid, and somewhat stronger and fuller left than right. Examination of the heart was negative. There was slight dyspnœa, with exaggerated breathing and an occasional râle. There was exophthalmos. Ophthalmoscopic examination showed haziness of the left papilla and tortuosity of the veins of both eyes. The urine was negative. Subcutaneous trocars were inserted, but the patient died suddenly without dyspnœa or other special symptoms. A diagnosis of malignant struma was made from the anamnesis, the growth of the tumor with the underlying tissue, and the enlarged veins. Autopsy confirmed the diagnosis. The tumor had grown through the sternum and ribs; the jugular veins were thrombosed and vascularized. The œsophagus contained varices extending to about 4 c.m. above the cardia. The tumor in part resembled jelly, and in part marrow, and contained numerous cysts and hemorhages. The tumor had evidently developed from a benign struma. The growth in the thorax and the obliteration of intrathoracic veins caused the most striking symptoms, including the œsophageal varices. Varices of the œsophagus are divided into two classes—congenital and acquired. Both varieties have caused death by hemorrhage. Friedrich reported a case of this kind in a child of six. The acquired variety is divided into those which are associated with old age, and are found along the entire length of the œsophagus, and those which result from stasis in the portal system, as in cirrhosis of the liver, and are located in the lower part of the œsophagus. Cases of hemorrhage from senile œsophageal varices are very rare. The case now reported represents a third variety of œsophageal varices. These are located in the upper two-thirds of the œsophagus, and are dependent upon stasis in the superior vena cava. The cause of stasis in this case was the metastases of the tumor inside the superior cava and its branches. According to Litten the œsophageal veins have two exits; those in the lower portion pass through the intercostal veins to the azygos, while those in the upper part empty into the inferior thyroids, in order to pass directly into the superior cava.

Diagnostic Tuberculin Tests.—Beck (*Deutsche med. Wochenschrift*, No. 9, 1899) reports the results of the diagnostic injection of tuberculin in the Berlin Institute for Infectious Diseases. Since 1891, 2508 persons have been tested; 1525 gave the reaction, but of these 371 had other evidences of tuberculosis; 338 had apical catarrh, and of these 298, or 85.2 per cent., gave a positive reaction. Two patients with intestinal tuberculosis, and five with uro-genital tuberculosis, gave positive reactions. Of 25 cases of laryngeal ulcer, 17 gave the reaction; 63.2 per cent. out of 106 cases of influenza gave the reaction; of 68 cases of pleurisy, 50, or 73.2 per cent., reacted; of 66 cases of bronchitis, 29, or 43.9 per cent.; of 76 cases of pneumonia (in the convalescence), 35.5 per cent.; of 14 cases of emphysema, 4, or 28.5 per cent.; 16 out of 17 cases of tuberculosis of lymph glands gave a positive reaction. In the negative case the disease proved to be sarcoma. Out of 13 cases of adenoid hypertrophy of the nose, 12 gave a positive reaction, and 3 out of 4 cases of ozæna likewise. In 96 cases of facial erysipelas, 52, or 54.2 per cent., gave the reaction, and in 25 cases of erysipelas of other parts of the body only 7. As in most of the former the disease began in the nose, the author looks on the adenoid growth as furnishing a favorable soil for the erysipelas coccus. One case of Addison's disease reacted to small doses (1 mg.). Chlorotics reacted to the extent of 53 per cent. Out of 127 cases of angina, only 47, or 37 per cent., reacted. Patients with gonorrhœa reacted to the extent of 55.6 per cent.; out of 143 syphilitics, 59 gave a positive reaction. Out of 15 cases of gastric ulcer, 10 gave reactions; in 13 cases of perityphlitis, 7 were positive. Most of the patients were women, and the author thinks that in women, who swallow the sputum more frequently than men, infection of the alimentary canal is especially likely to occur; 44 out of 87 cases of parametritis or perimetritis gave the reaction; 7 out of 20 of oöphoritis. Out of 55 women injected after abortion 11 reacted; 3 cases of lepra gave distinct reactions. The author points out that the results must not be applied generally, but the peculiarities of the service borne in mind. The great diagnostic value of the test is strongly brought out by the extensive series of cases. The later histories of the subjects who could be followed up are promised by the author, and will be awaited with much interest. The method used was the common one of ascertaining the absence of fever after taking the temperature at intervals of two hours for a day or two; then injecting 1 mg. of tuberculin; after one to two days, five and one-half days later, 10 mg. In children the doses are respectively 0.5, 1, and 5 mg. The injection is best given at night, as the reaction occurs about twelve hours later. A rise of at least 0.5° C. characterizes the reaction. If doubtful, the same dose should be repeated in a day or two.

SURGERY.

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Nephro-ureterectomy for Traumatic Hæmatohydro-nephro-ureterosis.—SUMMERS (*Medical Record*, July 29, 1899) reports the case of a young woman who fell on a street curb, striking on the right lumbar region, but sustaining such an apparently slight injury that she was able to walk home. Her physician found no alarming symptoms, and not until the following morning, when bloody urine was passed, did her condition become alarming. When seen in consultation she was taking a fair amount of nourishment, but was too weak to rise, with a slight rise of temperature, and a pulse varying from 84 to 100. She was not seen again for nineteen days, when she came into the hospital; there had been a remarkable change. Although there had been a tumor previously that could be readily detected, it had now reached the proportions of a cystic growth, occupying the lower median part of the abdomen, extending well over toward the left iliac spine and down into the pelvis; it also distended the right side of the abdomen, extending up into the kidney region. The passing of dark, bloody urine had continued. The coloring-matter was from the blood. The diagnosis made was of hydronephrosis from injury to the ureter, yet this did not harmonize with the discharge of bloody urine.

The operation was commenced by an incision extending from the lumbar region above the crest of the ilium a short distance below the anterior superior iliac spine. The tumor was exposed behind the peritoneum, but could not be separated at first. It was punctured by a trocar and canula, and a large amount of fluid removed. A separation of the tumor on the outside showed the ureter to be thickened and enlarged. There was no obstruction or injury to the ureter. The kidney and ureter were useless, and it was decided to remove both. The renal vessels were ligated and divided. The sac was peeled off from the pelvis and the right side of the abdomen, but beneath the peritoneum. The ureter was divided well down. The repair was prompt, but the recovery rather slow, the patient leaving the hospital in about two months quite well.

Every semblance of kidney tissue had disappeared from the tumor, which was a fibrous sac: there was no pyramidal or cortical substance. The alteration and atrophy in such a short time were remarkable. The author has found only one case referred to of such size; in this the patient died.

On the Importance of Plastic Surgery in Renal Distention (*i. e.*, **Nephrectasis**).—In a most important paper on this subject MORRIS (*The Lancet*, July 1, 1899) communicates his clinical experience in this particular branch of surgery. He deals especially with stenosis of the ureter, although he points out the fact that ureteral obstruction may be due to any of the following causes, which he has observed in cases under his care: 1. A valve formed of mucous membrane and situated near the renal pelvis. 2. Valvular formation caused by the obliquity of the ureter to the renal pelvis. 3. Stricture, including contraction of not more than one inch in length. 4. Ureter compressed by branch of the renal artery, abnormal or otherwise. 5. Calculus impacted in the ureter. 6. Fibrous band on the brim of the pelvis. 7. Twist of the ureter on its own axis. 8. Compression of the ureter by enlarged lymphatic glands situated between the ureter and iliac muscle. 9. A considerable length of ureter converted into an impervious cord. The pathological conditions named in the first four groups of the foregoing are amenable to plastic operations on the ureter and renal pelvis. That of the fifth group is removable by ureterotomy, a very successful operation for stone in the ureter, and now possible, no matter at what part of the ureter the calculus is impacted. A very slight operation after the ureter is once exposed at the involved part would suffice to remove without cutting the ureter itself—such causes as those in groups six and seven. The two last are now the only reasons for performing complete nephrectomy.

The present paper deals with the stenosis due to the first four causes, and is based on successful operations in five cases recently treated. It is premised that a movable kidney, as well as an abdominal tumor, due to hydronephrosis, is frequently an accompaniment of these conditions of the ureter. It is also very important to know that the degree of hydronephrosis is not by any means always sufficient to produce an abdominal tumor either of an intermittent or persistent kind.

Stricture or valvular obstruction of the ureter causes intermittent progressive impediment to the flow of urine, and sometimes results in complete and permanent obstruction. The resulting dilatation is a hydronephrosis or pyonephrosis, according to the presence or absence of septic conditions previous to the impediment. The condition may be diagnosticated if the nephrectasis is sufficiently large to produce a tumor that can be recognized. It is, however, frequently diagnosed as calculous nephritis. This may be the case when the pelvis is dilated to the size of a small orange and the calices the size of nutmegs. When the tumor is detectable the symptoms will probably be ascribed to movable kidney and the true condition neglected.

The etiology of valve formation varies; it may be congenital; sometimes it is the result of morbid mechanical changes in the ureter or renal pelvis. A temporary impediment due to some acute condition may result in the sacculation of the pelvis; it gradually increases, acting by its pressure upon the ureter to increase the intrapelvic urinary pressure till finally the sac becomes so distended that the ureter is no longer at the bottom, but its orifice is high on the side of the dilated pouch. Such a condition rapidly leads to the formation of a valve, and the impediment to the urinary flow rapidly increases. The increased weight of the kidney and pelvis may result in making it movable, and the sharp flexion of the kidney at the point where it is firmly held by the peritoneum increases further the difficulty. On the other hand, a floating kidney may be the original cause of the dilatation and subsequent formation of a valve, and anomalous renal vessels have been found to produce it. The dilatation does not always take place in the pelvis of the kidney, though this is a more frequent situation. Stricture, either acquired from ureteritis or traumatism from a calculus, or other source, or a stricture that is congenital, may produce sacculations of the ureter without there being any definite increase in the pelvis of the kidney.

The symptoms of this condition are variable, depending on the etiological factor of the individual case. Movable kidney may be either a cause or a result of nephrectasis. Many of the patients describe attacks of pain in the loin or groin, recurring at intervals of weeks or months over a period of one or many years. The pain often extends downward over the abdomen from the hypochondrium, spreading to the hip and thigh, and to the labium in woman, and the scrotum and testes in man. The pain is often ushered in with vomiting, or nausea, sweating, or by a general sense of illness, with fever and restlessness, or by a feeling of great coldness, which has been known to continue during the greater part of the attack. The attacks vary in intensity and duration, lasting hours, days, or weeks. During the interval there may be a nearly constant dull ache in the loin. In most cases there is a decrease in the amount of urine during the attack. There may be an increase in the size of the kidney during the attack. The urine may be quite normal or may contain only a few blood-corpuscles or numerous crystals of oxalate of lime, or it may be dark-chocolate color from the presence of blood and urates. Pus may be found in some cases in small quantities if there has been previous inflammatory conditions. In other cases the urine deposits a thick mucus after standing, and then cystitis is apt to be diagnosed, and the bladder submitted to much useless treatment in consequence.

Tenderness in the flank, especially on bimanual palpation, is a common symptom, whether there be a renal tumor or not. The kidney will be movable, probably, if the symptoms have existed for some time. Pressure over the kidney will elicit contraction of the abdominal muscles. If the stenosis is at the vesical end of the ureter, bladder symptoms will probably predominate, but it should be remembered that they are also excited by obstruction at the upper end of the ureter. The symptoms are increased at menstrual periods, and are liable to be confused with pelvic trouble. The general symptoms are neurasthenic and gastro-intestinal in character.

Operation is the only rational mode of treatment, and this should not be delayed till the hydronephrotic kidney can be detected, or till the kidney becomes movable. Strictures should be incised, and the angles of the cut sewn together as in cases of pyloric stenosis. Valvular folds of mucous membrane should be cut and their edges sutured together, so that the distended pelvis communicates directly with the ureter. In some instances kolpo-ureterostomy may be indicated, or grafting of the ureter into the bladder may be indicated. Finally, nephro-ureterectomy may be necessary when the kidney and the entire length of the ureter are involved in the tubercular disease.

The author tabulates a series of seven cases in which he has operated for stricture of the ureter or for obstruction due to valves.

Two Recent Cases of Successful Operation for Impacted Stone in the Ureter.—Freyer (*Lancet*, July 22, 1899) reports the result of operation in the following cases of impacted calculus in the ureter. A patient, aged twenty-three years, had suffered for nineteen months from renal colic and hæmaturia. He had repeated attacks, which continued in spite of all treatment, and were brought on by very slight causes. When first seen he had been relieved by morphine from an attack in which the pain was excruciating, accompanied by restlessness, nausea, and vomiting, with a constant desire to micturate, but only a small quantity of high-colored urine was passed on each occasion. For two days after this attack the urine was clear, but it became thick and bloody again. He found upon examination a slight movable tumor as large as two fists in the region of the right kidney, which was extremely tender on palpation both in the loin and in front. There was no stabbing pain on pressure at the back, but there was distinct tenderness at one spot in front midway between the navel and the anterior superior spine of the ilium. The urine had the color of Madeira wine; it was acid, specific gravity 1015, and it contained blood-corpuscles and crystals of oxalate of lime, and also albumin. The left kidney was normal. The diagnosis of renal calculus, with blocking of the ureter, was made. The operation disclosed a hydronephrotic kidney, but on opening it no calculus could be detected, although the whole pelvis and the calices could be readily palpated.

A catheter passed down the ureter detected an obstruction four inches below the pelvis of the kidney. A long silver probe detected the calculus. The incision was extended and the peritoneum raised from the ureter. The calculus was found to be the size of a filbert. The ureter was incised and the calculus removed. The ureter was not sutured because of the depth of the wound, the narrowing of the calibre of the ureter, and because its suturing does not always yield good results outside the peritoneum. A large drainage tube was carried from the lumbar incision down back of the kidney to the ureteral wound. The kidney wound was partially closed, permitting urine to flow through the lumbar wound from the kidney. Urine passed by the bladder and by this wound for several days. The tube was gradually shortened, and the patient finally recovered without a fistula.

In the second case the patient was fifty-three years old, and had multiple strictures and suffered from stone for several years. His left kidney had been explored with negative results, with temporary relief, followed by the recurrence of all the old symptoms. The pain in the left loin became very severe, at times radiating to the groin and testicles, and accompanied by hæmaturia, which at times was very profuse. There was occasional pain in the right loin. The urine was extremely thick and offensive, and on standing it deposited about half pus. The left kidney was explored, but no kidney was found, although an extensive and careful search was made. The patient recovered rapidly, with only temporary relief. The multiple strictures were then divided by internal urethrotomy, but without much benefit. Later a cystoscopic examination showed a long pencil-shaped calculus projecting from the ureter into the bladder about three-quarters of an inch. It was caught by the lithotrite, drawn out and crushed, and the débris, which was made up of 12 grains of urates, was washed out. The patient was much benefited by the operation, although there is some cystitis remaining.

The author reports five other cases of calculus in the ureter, four of which were impacted at the entrance into the bladder. One in a female was removed by dilating the urethra and drawing the calculus down into the bladder; the others were in males, and were removed by a perineal incision. In another a calculus was crushed in the bladder of a boy and removed. A second was felt impacted in the ureter, which he proposed to remove by suprapubic cystotomy. It, however, passed into the bladder, and was crushed and removed. In the fifth an obscure cystic tumor of the bladder, which contained two calculi, weighing 41 grains, was removed suprapubically.

A Comparison of the Merits of Suprapubic and Perineal Cystotomy.—Dandridge (*Annals of Surgery*, July, 1899), in comparing the merits of these two methods of entering the bladder, reviews the history of their development and the advantages that have been claimed for each and the arguments that have been advanced against each. He finds that while surgeons are generally in unison regarding the perineal operation, its method and the results obtained by it, there is yet a wide diversity of opinion regarding the best method of procedure in the suprapubic operation, the after-treatment, and the causes of failure or of death that result after it. He believes that unexpected difficulties may be said to be more likely in the suprapubic than in the perineal operation. The wound is longer in healing. The patient requires more care and attention, and a permanent fistula is more likely to result, and where healing takes place a breaking out again is more liable to occur. With reference to the employment of the two operations, where drainage is the therapeutic measure desired, he prefers the perineal route, because it drains better with the patient in bed, and subjects him to less discomfort. The perineal wound heals more quickly and with less leakage if the tube can be withdrawn. It is less likely to offer difficulty, and its performance takes less time. It affords a better opportunity for permanently removing the cause of obstruction, and so secures a permanent relief without in any way increasing the danger. It is less likely to interfere with the restoration of normal contraction, and is in itself a less dangerous way of opening the bladder. However, in cancer of the bladder, tuberculosis, and hemorrhage, suprapubic cystotomy affords the greater advantage. In comparing these two operations in cases of calculus he would of course prefer the crushing operation to either. When the perineal operation of lithotrity for the crushing of large stones is taken into consideration it would seem as if cutting for stone would be very limited in its application in the near future. He restricts the high operation to stones of most unusual size, to encysted stone, to stones complicating tumors, and to cases where some deformity prevents the perineal operation.

The value of castration and other methods of relief in cases of hypertrophied prostate have reduced the number of cases that should be submitted to any operation considerably. While the high operation has the advantage of making the field of operation visible, it has been found best to combine it with a perineal incision. He considers the perineal route to possess certain decided advantages. It affords better drainage and permits a catheter to be readily introduced when needed. It can be used when drainage is urgently needed, and can be accomplished rapidly, avoiding ether shock. The suprapubic route is to be preferred in removing tumors, as they can be readily reached and hemorrhage controlled.

PEDIATRICS.

UNDER THE CHARGE OF

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A New Treatment of Whooping-Cough.—V. GILBERT (*Revue médicale de la Suisse Romande*, June 20, 1899, p. 373) reports some striking results accomplished in modifying the course and severity of whooping-cough by the administration of antidiphtheritic serum. The first suggestion of the method came from the beneficial effects secured by the administration of antitoxin in a case of coexisting pertussis and diphtheria. The patient was a child of three and one-half years, who had from twenty-five to thirty paroxysms in the twenty-four hours. On the ninth day of the paroxysmal stage 10 c.c. of antidiphtheritic serum were injected for the treatment of an intercurrent diphtheria. On the following day there were twenty-five paroxysms, and 5 c.c. of serum were injected. The next day only twenty paroxysms were counted, and on the following day only sixteen, when a third injection of 5 c.c. was made. Three days later only eleven kinks occurred, and the night was passed comfortably. Two days later only five kinks were counted, and they continued to diminish in intensity until nine days after the last injection, when there was scarcely any cough, and this had lost its characteristic quality. Eight other observations are given, in seven of which the serum was administered in the absence of diphtheria, and the effect upon the pertussis was quite as striking as in the first case. The duration of the paroxysmal stage never surpassed five to ten days; the number of paroxysms rapidly diminished, falling in the course of six or seven days from twenty or thirty in twenty-four hours to three or four, with almost complete disappearance of the repetitions. The violence of the cough also became greatly modified. Vomiting always ceased after the injections. The remaining slight cough was easily controlled by antispasmodic treatment, preferably by bromoform.

The total quantity of serum employed never exceeded 10 c.c., except in the two cases of diphtheria, in which the larger doses were required. The quantity used at a single injection varied between 2 and 5 c.c., and the intervals were two or three days.

No local disturbances occurred in any of the cases, though the entire contents of a bottle were not used at a single séance.

Secondary accidents were not more frequent than in diphtheria; twice there was urticaria, once arthralgia with erythema nodosum, once extensive erythema of the buttocks and abdomen, once a scarlatiniform eruption, and once a morbilliform eruption. In three cases out of the nine there was no secondary manifestation. These accidents, however, appeared to have had no influence upon the course of the disease.

The employment of antidiphtheritic serum in the treatment of pertussis, the author has discovered, has been exploited by other clinicians. Lotti, of Lecco (*Semaine Médicale*, 1897, No. 24), observed like beneficial effects in a case in which the serum was used for intercurrent diphtheria, and Cerioli, of Broni (*Semaine Médicale*, 1898, No. 41), employed it with excellent results in fifteen cases in which, besides the symptoms of the disease, complications, such as bronchitis, bronchopneumonia, epistaxis, and hæmoptysis were favorably influenced. Whether the results obtained were due to the diphtheria antitoxin or to the blood-serum of the horse, the author does not venture to decide. He asks for more extended observations.

Pott's Disease in the Nursling.—Frœlich (*Annales de Médicine et Chirurgie Infantiles*, January 15, 1899, p. 82) presents an interesting study under this title, based upon twenty-six personal observations. The seat of lesion was always the lumbar segment of the vertebral column, at the first or second vertebræ, twenty-two out of twenty-six times. There is at first always paraplegia, followed by rigidity of the lumbar region, and then a large lumbar gibbosity, not angular. The paraplegia may be distinguished from infantile palsy by the fact that it affects both legs, is never complete, and the reaction of degeneration is not present. From rachitis it may be differentiated by the freedom from pain on pressure.

When deformity is the first symptom it may simulate rachitic lumbar kyphosis or a transitory vicious attitude. In either of these conditions the lumbar portion of the spine remains supple, and when there is ankylosis in rhachitis it is a lumbo-dorsal cyphosis, which is readily recognized.

Tannalbin in Acute Follicular Enteritis.—Cozzolino (*Gazz. degli Ospedali*, November 13, 1898) speaks highly of this agent in irrigation of the bowel, using it in the proportions of 1 to 10 per cent. in starch water. When tenesmus is marked, two or three drops of laudanum are added.

The treatment is begun by the administration of small doses of castor-oil or calomel. The lavement of tannalbin should be immediately preceded by a large evacuating lavement of salt solution or sterile water, for the purpose of cleansing the intestine and bringing the drug into more direct contact with the affected mucosa.

He considers his results much better and more rapid than those obtained by the use of the usual astringents, such as tannin, sulphate of zinc, nitrate of silver, alum, or acetate of lead.

Paralysis in Whooping-cough.—Horveno (*Des Paralyses dans la Coqueluche, Thèse de Paris*, 1899) has collected forty-six observations of paralysis in the course of pertussis, and from a study of them concludes that paralyses occur most often in the course of a febrile attack with intense paroxysms. The forms are varied, resulting from lesions of the brain, cord, or of the peripheral nervous system, and the prognosis is serious, some of the cases terminating rapidly in death.

Etiology of Night Terrors.—Rey (*Archiv. f. Kinderheilkunde*, Bd. xxv., Heft 3, u. iv) has found in all of thirty-two cases of night terrors that adenoid vegetations were present. After removal the terrors subsided. He therefore believes that adenoids are the most frequent cause of this disturbance, acting by the production of a carbonic-acid poisoning produced by interference with respiration.

Digitalis in Pediatric Practice.—Comby (*Revue Internationale de Médicine et de Chirurgie*, vol. ix. No. 11) presents a concise résumé of the uses of this valuable drug in the diseases of childhood. It is indicated, he says, in cardiac disease, whether congenital or acquired, whenever the muscular contractions become of insufficient strength. It is especially valuable in mitral disease, but is contraindicated in aortic insufficiency until the pulse becomes rapid and irregular. It is useful for its diuretic action in respiratory diseases, like hydrothorax and pleurisy, and for its effect upon the heart in pneumonia, severe bonchitis, and influenza. In repeated severe hæmoptysis it slows the heart and relieves pulmonary congestion. Chronic congestion of the kidney and chronic nephritis are benefited by digitalis unless the left ventricle is hypertrophied. In acute infectious diseases it is valuable if given before the myocardium has undergone marked degeneration. The drug is not contraindicated in acute nervous affections.

In view of its cumulative action, digitalis should never be given for a longer period than seven or eight consecutive days, and then its use must be suspended for from eight to ten days.

Three Steps in the Tuberculous Process in Children.—David Bovaird, Jr. (*New York Medical Journal*, July 1, 1899, p. 1), supplements Northrup's studies upon the subject of the primary seat of infection of tuberculosis in children, and by combining his results with those reached by the latter (*New York Medical Journal*, 1891) draws the following conclusions:

1. The primary lesions of tuberculosis in children is regularly in the bronchial lymph nodes or lungs. Combining Northrup's series with those described in the paper there is a total of 200 cases, of which 148 could be attributed to infection by the respiratory tract, 3 to infection by mesenteric lymph nodes, and 49 indeterminate.

2. As to early manifestations of tuberculosis in children, these are extremely indefinite and uncertain.

a. Tuberculous infection of the bronchial lymph nodes, as a rule, cannot be diagnosticated.

b. Latent tuberculosis is often aroused and disseminated by the invasion of another disease (infection), such as measles, diphtheria, etc., the presence of tuberculosis not being suspected.

c. The common type of tuberculosis in children is the acute miliary—it may occur in well-nourished infants.

d. The course of tuberculosis is most often confused with chronic bronchopneumonia or entero-colitis.

e. The early manifestations are progressive emaciation, fever, and the presence of râles over the lungs. These are insufficient for purposes of distinction.

3. The terminal lesions include:

a. Extension of the tuberculous process in the bronchial lymph nodes and lungs, resulting in the formation of abscesses, cavities, etc.

b. Diffusion of the tuberculous infection, constituting acute miliary tuberculosis, the principal viscera being affected in the following order: Spleen, liver, brain, kidney, and heart. The involvement of the brain is most important, the meningitis being regularly fatal.

c. When bone is involved and there is prolonged suppuration, waxy degeneration of the viscera may occur.

Comparative Value of Recent Antiseptics in Pediatric Practice.—Gustavus M. Blech (*Transactions of the American Medical Association*, June 7, 1899; *Medical Record*, July 1, 1899, p. 26) divides antiseptics of use in pediatric practice into four classes: (1) Those which act on the respiratory tract; (2) those acting on the gastro-intestinal tract; (3) those affecting the urinary apparatus; (4) those which influence the whole organism. Urotropin is decomposed by the urine and destroys the bacteria in this fluid. Guaiacol carbonate is comparatively tasteless and non-irritating, and is very useful in the treatment of chronic bronchitis. Tuberculosis, he states, could be cured in its first stage and second stages by the antitoxic treatment, but drugs have but little curative effect in the later stages of this disease, and Murphy's nitrogen treatment has already proved a failure. Nosophen has been proved harmless; antinosin has been used in solution of 2.5 per cent. strength without producing irritation. The author has used it exclusively as a disinfectant and cleansing solution in the nasal passages. Eudoxine, the bismuth salt of nosophen, is an excellent remedy in diarrhœa, experiments having proved that by the action of the gastric juice stable salts of bismuth are formed, the nosophen passing on unaltered to the intestine.

THERAPEUTICS.

UNDER THE CHARGE OF

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Antistreptococcic Serum in the Treatment of Smallpox.—DR. W. J. LINDSAY, finding that death most often occurs about five days after the pustules have dried and have begun to be absorbed, believes it to be caused largely by reinforcement of the specific virus of variola with pyogenic toxins. Patients were chosen who from analogy might have been expected to die, all exhibiting confluence early in the pustular stage. Antistreptococcic serum was injected aseptically into the subcutaneous tissue of the abdominal wall, just before or coincident with pustulation, repeated at intervals of twelve to twenty-four hours. Digitalis with tincture of iron chloride or liquor strychnine was given four-hourly. In no instance were more than three injections given. Patients thus treated exhibited a shorter period of absorption, the intensity of the toxæmia is lessened, and the tendency to cardiac failure is diminished. Convalescence begins sooner and is rapid. Of six patients so treated none of the four recovering developed abscesses, nor was there local pain, arthritis, or hyperpyrexia.—*The British Medical Journal*, 1899, No. 2002, p. 1144.

Malta Fever Treated with Malta Fever Antitoxin.—DRS. E. D. FITZGERALD and J. H. EWART report that after continuous treatment with calomel and phenacetin no lasting improvement resulted.

The germ of Malta fever was not detected in the blood, but the results of treatment left no doubt of the correctness of the diagnosis. Five drachms of the antitoxin were injected into the subcutaneous tissue of the abdomen, the temperature having been subnormal for five days. The following day 5 drachms were again injected, the temperature being 99°. For the next few days the temperature varied between 98° and 100° F. One week after the first injection was given a severe urticaria first appeared on the abdomen in the vicinity of the site of the injections. A febrile movement continued, and on the expiration of the second week another 5 drachms of antitoxin were injected. The temperature rose to 104.6° F., and the patient was very ill. The urticarial rash was more pronounced, the joints were swollen and painful. There was a slight cough, and the expectoration was tinged with blood. The authors suggest an internal urticaria, causing exudation from the serous membranes involved. A few days later the patient was more comfortable; the temperature fell to normal, and he soon became convalescent. Subsequently a subnormal temperature developed, lasting for several weeks, but there was no return of other symptoms. A blood examination was made. Before the first injection of antitoxin the hæmoglobin was 120, and the corpuscles 7.3. A second examination after the second injection showed hæmoglobin 105 and corpuscles 6.93.—*The Lancet*, 1899, No. 3946, p. 1024.

Tetanus Antitoxin.—Dr. E. Tavel states that subcutaneous injection gives temporary immunity which may last from four to six weeks, and may be continued by repeated injections. This should be employed in those instances when the character of the injury or opportunity for infection suggests danger. It is useful only against tetanus infection, so that ordinary aseptic measures should not be neglected. The amount required is 2 drachms, and this may be repeated a week later. When tetanus is fully established this treatment has its limitations, and, indeed, will be successful only when the amount of toxins is not much greater than the usual fatal amount. If this is much greater and the incubation is short and severe symptoms are present, the treatment by injection will not avail because of the impossibility of injecting a sufficient quantity of the remedy. On the other hand, in intracerebral injections a smaller quantity will suffice, and the serum is rapidly brought into contact with the toxins held in the brain-substance, and can neutralize it. The necessary amount is about 1 drachm, and this may be repeated as often as is necessary. To neutralize the toxin which is circulating in the remaining portions of the body 1½ to 3 ounces of serum may be administered by intravenous injection. This is especially important if the tetanus bacilli or their toxin are still found in the wound. If intravenous injection is not practicable, subcutaneous injection in thigh, abdomen, chest, or arm may be substituted.—*Correspondenz-Blatt für Schweizer Aertze*, 1899, No. 8, S. 235.

The Therapeutic Value of Marmorek's Serum.—Dr. Wm. L. Baum draws thre following conclusions: (1) In pure streptococcic injections the serum undoubtedly exercises a favorable influence on the course of the disease. (2) In mixed infections the influence of the serum was demonstrable, but it merits further trial as an adjunct to other treatment. (3) In view of the grave character of complications of non-streptococcic nature reported, ordinary rules of therapy would demand that in such cases, as with the diphtheria antitoxin, all indicated therapeutic measures must be employed, as well as the serum. (4) As erysipelas streptococci and phagocytes often exist together in the lymph channels, it is fair to assume that the influence of the serum is directly exerted bactericidally on the streptococci and not entirely through stimulation of phagocytic action. (5) The initial dose in all cases should be 5 drachms, to be followed by one-half or two-thirds of this dose, according to the indications, every twenty-four hours.—*Medicine*, 1899, vol. v. p. 23.

Arsenic in Treatment of Accidents of Thyroid Extract Administration.—M. L. MABILLE recommends the use of arsenic to counteract rapidity of heart action following overdoses of thyroid extract. Oxidation, which is so greatly increased by thyroid extract, is also much diminished by arsenic. Animals to which thyroid extract (iodothyrin) had been given exhibited on the administration of arsenic (Fowler's solution) a marked slowing of the pulse. In animals to which only the iodothyrin was given there were seen acceleration of the pulse, excitation, and trembling, a loss of weight of more than three pounds, anorexia, and gastric disturbance. Thyroid extract furnished similar results. The author recommends simultaneous exhibition of thyroid extract and arsenic, thyroidism being either avoided or ameliorated. A goitrous patient, beginning with 3 grains of thyroid gland, was taking 10½ grains after ten days. Intolerance followed; there was violent palpitation, rapid pulse, vague pain, and trembling. Beginning with two drops of Fowler's solution the dose was increased to twelve drops, and then thyroid administration was again commenced, as much as 12 grains being given. The symptoms of thyroidism disappeared. Medication was continued, with success, and no emaciation followed. The addition of arsenical preparations in relatively large doses permits the toleration of thyroid extract, often borne so badly when given alone.—*Les Nouveaux Remèdies*, 1899, No. 9, p. 195.

Gelsemium Sempervirens.—DR N. P. BARNES maintains that this drug should receive more attention because of its great therapeutic value. One-fifth of 1 per cent. is the average amount of alkaloid in the severed root, and constitutional effects are regularly obtained from the standard fluid extract. Gelseminine, the alkaloid, is a non-crystallizable dry mass, white, alkaline, insoluble in water, but soluble in alcohol, ether, and chloroform. There are several unofficial preparations, but the official fluid extract and tincture are very satisfactory. The drug is antispasmodic, antipyretic, antineuralgic, antimalarial, analgesic, hypnotic, and diaphoretic. Through its direct action on the spinal cord, dulling and paralyzing mobility and sensibility, it is a nervous sedative and depressant. The third, fourth, fifth, and sixth cranial nerves and those supplying the genito-urinary organs are especially affected. Reflex excitability is first increased and then diminished, and finally exhausted. Small doses, one-half to one minim of the fluid extract, relax the general nervous system, relieve nervous irritation and muscular tension. Large doses, one to five minims, cause languor, enfeeble muscular action, impair sensibility, dilate the pupils, cause ptosis, and excite diaphoresis. Effects of a moderate dose disappear in three hours. Toxic doses (ten minims or more) produce vertigo, diplopia, ptosis, mydriasis, prostration and muscular relaxation, partial paralysis of sphincters, respiration, and, lastly, heart failure. Antagonists are small doses of opium, or morphine and atropine. Six to eight hours elapse before a toxic dose is fatal. It is indicated in conditions of exalted nerve function, mental excitation, and muscular tension. Early in fevers it is antipyretic and sedative. As a succedaneum to quinine in malaria it is of value, relieving the unpleasant effects of the former. The head symptoms in a commencing "cold" are dissipated in a few hours. In grippe, gelsemium controls the fever, headache, pains, and restlessness. Pain of a neuralgic or rheumatic character is relieved by this drug where there is arterial excitement or local congestion. In tic douloureux it is almost specific. Coccygodynia is often cured, and in sciatica gelsemium is useful, but not curative. Ovarian neuralgia and uterine colic (?) are efficiently treated with it. Headaches, neuralgic, congestive or periodic, are promptly relieved. With sodium bromide gelsemium is a most efficient hypnotic. Muscular spasms, such as epileptic and hysterical convulsions, are relieved. To prevent erections and chordee in gonorrhœa, gelsemium is invaluable. In catarrhal cystitis, irritable bladder, and incontinence of urine from spasm of muscular fibres gelsemium is excellent.—*Maryland Medical Journal*, vol. xli. p. 288.

Treatment of Diphtheritic Paralysis.—Dr. Francis Hoben insists upon absolute rest in a well-ventilated room, good food, good air, tonics, and particularly iron in a digestible form. Strychnine should be given in full doses by the mouth, or, in severe cases, hypodermatically. Recently the nitrate in one-fiftieth of a grain dose was given subcutaneously twice daily for two weeks, and subsequently once a day for some weeks longer, with excellent results, to a child two and one-half years old. The subcutaneous method should be chosen if the constrictors of the pharynx are involved, if the heart or respiration show the toxic effects of the poison, or if the muscular incompetency is pronounced. Careful massage of the extremities will improve the cutaneous circulation and the condition of the muscles. If respiration is endangered, electricity, used with judgment and intelligence, must be employed in addition to artificial respiration and rhythmical traction of the tongue.—*Pediatrics*, 1899, No. 11, p. 50.

The Treatment of Some Climacteric Neuroses.—Mr. W. J. Handfield Haslett regards a change of scene and environment as the first principle of treatment, but not travel. The patient should be much in the open air, but short of physical exhaustion. For insomnia try the open-air treatment or the warm bath at night. If persistent sleeplessness demand drugs, use paraldehyde, commencing with one-half and increasing to three drachms if necessary. The nutrition of the patient must be maintained. On examination the tongue will be found to be flabby and thickly coated; there will be acid eructations and perhaps vomiting. This condition is due to defective innervation of the alimentary tract, and the patient needs ten eggs a day, with two quarts of good milk, a quart of strong vegetable soup, with perhaps a little brandy if the heart be weak, and an occasional dose of Epsom salts, and in a week or two the tongue will be perfectly clean, and the patient gains in weight. Of tonics, nux vomica and iron ammonio-citrate are the best. If the patient is maniacal, iron is strongly contraindicated. If the symptoms of malnutrition are prominent, massage and the Weir Mitchell treatment are useful, and if there is much stupor faradic electricity often does much good. If the patient is restless and agitated by day, and especially when the skin is dry and harsh and the pulse hard, nepenthe is by far the best sedative.—*Treatment*, 1899, No. 7, p. 208.

Treatment of Headaches.—Dr. R. E. Peck lays stress on the importance of recognizing that headache is usually a symptom, and that it is necessary to seek for its cause in order to effect a permanent cure. He discusses the various forms of headaches and the conditions to which they point, such as syphilis, brain tumor, malaria, and concludes by discussing hydriatic procedures for the relief of headache due to neurasthenia. Water (50° to 75° F.) is to be thrown on the chest, back, and abdomen from the hand of an attendant. Better results are obtained in hydriatic institutions by the use of the ordinary douche, the temperature of the water being 50° to 80° F. under a pressure of ten to twenty pounds to the square inch. As the pressure is increased the temperature is to be diminished at each sitting until the limit of the reactive power of the patient is reached. The needle spray is then to be used. Before beginning with the douche three to five minutes should be spent in a hot-air box (temperature not indicated) to dilate the arteries, and afterward a brisk twenty-minutes' walk is taken in the open air. The author advocates Dr. Herter's method of treating migrainous headache by lavage, whether the stomach contains food or not. The temperature of the water should not be less than 105° F. Pain is thus relieved, and if done early an attack may be aborted. The drinking of hot water may be substituted for lavage where the latter is impracticable. Following lavage a rapidly acting cathartic is given. The *rationale* of the treatment is that there is some underlying disease of the nervous system in patients subject to migraine, predisposing to the irritating effects of certain poisons, especially those produced in the alimentary canal by the action of bacteria and by the imperfect digestion of the proteids. These toxins are largely eliminated by lavage and cathartics.—*Yale Medical Journal*, 1899, vol. v. p. 372.

Gold in the Treatment of Anæmia and Malnutrition—Dr. J. P. Sheridan rather deprecates the use of iron and "various æsthetic elixirs" as convenient placebos, and recommends in anæmia and malnutrition "a tonic alterative and proper food." He recommends the liquor of gold, arsenic, and mercury bromides. It is tasteless and can be given in milk, and is especially indicated when the above conditions occur in childhood. The secondary anæmia of syphilis following treatment with the usual mercurial preparations can be very successfully treated by it. In too frequent menstruation, and in apparently a variety of diseases of women, a preparation of gold and arsenic—composition not being given—is greatly lauded.—*The New York Medical Journal*, 1899, vol. lxix. p. 634.

Aspidium Spinulosum.—Dr. Walter Laurèu recommends an ethereal extract made from the rhizome of this plant as an efficacious remedy, in dose of one drachm, for tapeworm. In an instance reported, two hours after administration castor-oil was exhibited, and one and one-half hours thereafter the head and twenty-five feet of a bothriocephalus latus was expelled. Success followed its use in other instances. The substitution of this for the official aspidium is recommended when the plant is more plentiful.—*Therapeutische Monatshefte*, 1899, Heft 4, S. 211.

[Attention has been called to the value of other aspidia in the hope that an explanation may be found for the occurrence of poisoning from the use of the official aspidium. It has been suggested that its toxicity varies with the country of its growth. By using the indigenous aspidium this danger may be avoided. It is a curious fact that in most fatal cases castor-oil has been used. It would be well to substitute some other cathartic.—R. W. W.]

OBSTETRICS.

UNDER THE CHARGE OF

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The Weight of the Fœtus and of the Placenta in Cases of Maternal Albuminuria.—WIPPERMANN (*Archiv für Gynäkologie*, 1899, Band lvii. Heft 3) tabulates thirty-four cases of nephritis during pregnancy and of albuminuria during pregnancy, and has studied the effects of these conditions upon the fœtus and the size of the placenta.

Eleven of these cases had chronic nephritis, and none of them went to the normal termination of pregnancy. Two of the eleven died in the ninth month. Twenty-three patients had acute nephritis of pregnancy, and of these three died shortly after delivery. As regards the placenta, it is interesting to note that in chronic nephritis infarcts are present in the placenta in 90 per cent. of cases. In the acute nephritis of pregnancy infarcts are present in 65 per cent. and absent in 35 per cent.

His investigations show that chronic nephritis profoundly influences the placenta and brings on labor before the natural end of pregnancy. The development of the entire ovum is greatly affected, and many of these children perish.

Albuminuria lessens the development of the fœtus and makes its weight less in proportion to that of the placenta.

It is interesting to compare albuminuria and syphilis, as both conditions result at times in fœtal death, and both influence the development of the fœtus. In each of these conditions the placenta is relatively larger than normally; in the case of albuminuria because the child is less well developed, while in syphilis the increased weight of the placenta results from the deposit of foreign material in its tissue.

Phloridzin-Diabetes in Mother and Child, and its Relation to the Question of the Secretion of Urine by the Fœtus.—In the *Archiv für Gynäkologie*, 1899, Band lvii. Heft 3, SCHALLER contributes a very interesting paper upon this subject, in which he narrates experiments by the administration of phloridzin in pregnant women and the examination of the urine of mother and child during and after labor. His studies lead him to conclude that we have no evidence that the fœtus secretes urine regularly and discharges it periodically into the amniotic liquid during pregnancy. The kidney secretion of the fœtus normally begins during labor, under the influence of increased pressure in the placental circulation caused by uterine contractions. In the greater number of cases the fœtal bladder is not emptied during birth into the amniotic liquid. It is only in very rare cases that the fœtus will discharge urine into the amniotic liquid, and this occurs when the placental circulation is interfered with by birth-pressure during prolonged labor. The amniotic liquid is not derived from the fœtus, but is a transudate from the maternal bloodvessels.

The kidneys of the new-born child act much more slowly than those of the adult, and a regular performance of their function is not established until some time after birth.

[These very interesting observations throw light upon the very gradual secretion of urine by new-born children. Cases are repeatedly brought to the attention of physicians by careful nurses in which no positive evidence that an infant has secreted urine can be obtained for several hours after birth. Many of these children suffer no inconvenience from the late assumption of the urinary function. If the child be kept warm and its circulation maintained, and it be given water freely, there occurs a discharge of highly colored urine, often rich in uric acid, and the gradual formation of the usual secretion.]

Slowing of the Pulse During the Puerperal State.—VARNIER (*Annales de Gynécologie et d'Obstétrique*, January, 1899) has conducted a series of observations to determine the presence of slowing of the pulse, which has been commonly thought to occur after labor.

In thirty-two pregnant women in whom the pulse was taken during the last two months, it was found to be above 75, and only occasionally below this average in twenty-six, or 81 per cent. Four of these patients had a pulse which averaged 75, and in two of them the pulse was distinctly below this average. A second series of eighteen patients was examined who had been confined, and in whom the pulse was taken in the morning only, while in seventeen others it was taken morning and evening. The duration of these observations was from nine to sixteen days. It was found that of these thirty-five puerperal women but one had a pulse above 75. Twenty had pulses averaging 75 and fourteen below 75. In most of these women the average pulse-rate was as low as 70.

It was found that slowing of the pulse occurs more frequently among the multiparæ than primiparæ. The lowest rate observed was 40, and the highest in multiparæ 68. From the fifth to the eighth day the pulse was usually slowest, then on the seventh day, and occasionally the diminution in the pulse did not occur until the tenth day. A rapid increase in the pulse-beat was usually observed when the patient first left her bed.

Unusual Forms of Puerperal Hemorrhage.—MARX (*Medical News*, March 4, 1899) reports several cases of unusual puerperal hemorrhage.

In one at five months premature labor occurred, followed by the interrupted expulsion of three fœtuses. The last was expelled five weeks after the first. Until expulsion was complete the patient had slight intermittent hemorrhage. In another case a physician mistook a greatly distended bladder for the relaxed uterus, and practised massage vigorously. There was continued bloody lochia, and when the bladder was emptied by catheter the urine was also bloody. The patient was promptly relieved when the bladder was emptied. In a third patient when convalescent a very distended bladder caused severe hemorrhage, from which the patient very slowly recovered. A multipara had involution of the uterus and prolonged bloody lochia. Seventeen days after labor, during the action of the bowels, the patient was seized with intense pain in the abdomen. This was followed by hemorrhage. An organized placental polyp, attached by a long pedicle to the fundus, had partly inverted the uterus. The growth was removed and the womb replaced.

A scorbutic primipara was easily delivered with forceps. Hemorrhage occurred into the vulva, extending around the rectum into the broad ligament. The hæmatoma was incised, irrigated, and packed with gauze. The patient afterward died of tubercle. Fatal hemorrhage occurred in a multipara who seemed to be a bleeder. All efforts to check the hemorrhage, which oozed from the entire genital tract, were unavailing.

Secondary hemorrhage from a torn cervix proved fatal in a multipara who bore a child in breech presentation. The bleeding was controlled at labor by gauze packing. When, however, the gauze was removed on the third day the patient died from hemorrhage.

[These cases resolve themselves into three classes. Those in which profound affection of the blood is present can rarely be controlled. A distended bladder should be diagnosticated and promptly relieved. Hemorrhage from the lacerated cervix should be treated in but one way only, and that by suture. The writer urges that an enlarged womb and bloody lochia should excite the suspicion of the physician and demand attention. In this he is certainly right.]

Three Cases of Labor in Double Uterus.—In the *Zeitschrift für Geburtshülfe und Gynäkologie*, 1899, Band xl., Heft 2, Wagner reports three cases of labor in double uterus. The first was that of a multipara who had previously had an abortion. On admission to the hospital the patient was seven months pregnant, and the child was about to be born. It was spontaneously expelled, but the placenta was retained. Five hours after birth, having failed to express the placenta, the patient was anæsthetized and the placenta manually removed. The womb was found divided by a septum, the placenta being in the right half. It was attached to the fundus and also to the septum. The wall of the womb was very thin where the placenta had been attached, but thick in other portions. The patient made a good recovery.

His second case was also a multipara, who had a transverse presentation. Version was done without especial difficulty and the child easily extracted. Immediately afterward the womb assumed the characteristic two-horned shape. A septum was found dividing it into two portions. It was necessary to remove the placenta manually. The half of the womb which had not contained the fœtus was tightly contracted and lined by decidua. This patient had thrombosis of a vein dating back to a previous typhoid. She made, however, ultimately a good recovery.

Case third was a primipara, whose child was in breech presentation. Heart sounds could not be heard, and the mother had ceased to feel movements. The uterus assumed the characteristic two-horned shape. On examination both vagina and uterus were found double, divided by a septum. The vaginal septum was incised with scissors and the child delivered still-born. Post-partum bleeding occurred, and it was necessary to remove the placenta. This patient recovered after passing through a mild septic infection.

On reference to the literature of the subject it was found that pregnancy rarely proceeds to full term in these cases. Patients who have this abnormality have normal pelves and give no external evidence of it. During pregnancy these patients are not exposed to the dangers of hemorrhage. A decidua forms in the empty half of the womb.

Labor is influenced but very little by the presence of the septum, and the half of the womb which contains the child contracts normally. When, however, the child is expelled the womb fails to remove the placenta, and manual interference is necessary. In ordinary cases the placenta must be removed by the hand in but $\frac{8}{10}$ of 1 per cent., while in patients having this abnormality such interference is usually necessary. If the septum in the vagina and uterus be divided and the tissues packed with gauze, a good result follows, and these patients may afterward go to full term and be normally delivered.

Hemorrhages in the Early Months of Pregnancy.—In a clinical lecture at the Glasgow Maternity Hospital, JARDINE (*Scottish Medical and Surgical Journal*, March, 1899) called attention to cases of supposed menstruation during pregnancy in which the hemorrhage occurs from the unimpregnated half of a double uterus. Bleeding in early pregnancy may also come from a diseased cervix. He described two cases of women, pregnant about the seventh month, who had sustained wounds of the labia, which bled excessively. It was necessary to suture these wounds, to tampon the vagina and vulva with gauze, to make pressure by a large vulvar pad and "T" bandage and apply cold. He also called attention to early ectopic gestation as a cause of hemorrhage, and reported a case in which a patient expelled a cast of the uterus, which on examination showed neither decidual cells nor chorionic villi. It was evident that pregnancy had not been present. In cases of hemorrhage and cramp-like pain he considered the microscopical examination of the lining membrane of the womb to be of the greatest importance.

The Placenta in Triple Pregnancy.—In the *American Journal of Obstetrics*, March, 1899, DRENNAN reports a case of triplets and describes the placentæ. The cords of the last two fœtuses delivered were attached to a small placenta, which must have been separated from the uterine wall for some time. It was shrivelled, and the two cords were thin and collapsed. The first fœtus had a good-sized and healthy placenta, which was delivered manually from the uterus.

[We recently had occasion to observe the appendages in a case of triplets. There were two fairly formed placentæ, the third being much smaller and apparently developed in the membrane of the other two. The cord of the third fœtus ran along the membrane for a considerable extent. In Drennan's case the first fœtus was well developed, and labor came on at about five months. In the case to which we allude the pregnancy ended much later, and two of the children lived for some time. The fœtus attached to the smallest placenta died soon after birth.—Ed.]

GYNECOLOGY.

UNDER THE CHARGE OF

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Vaginal Hysterectomy with Doyen's Clamp.—Thumin (*Centralblatt für Gynäkologie*, 1899, No. 5) reports thirty-one successful operations in which the broad ligaments were temporarily compressed with an instrument devised by him on the principle of the angiotribe of Doyen and Tuffier. All the operations were bloodless, and the convalescence was uncomplicated. The effect of the great pressure maintained for two minutes before removal of the clamp, as shown by microscopical examination, is to cause obliteration of the arteries by adhesion of the opposed endothelial surfaces, while the proximal and distal ends are plugged by thrombi—in short, the tissues are mummified but not necrosed.

Resection of Diseased Ovaries.—Gersung (*Ibid.*) advises that in cases of small ovarian cysts an attempt should be made to save a small portion of healthy stroma. He has made it a practice to enucleate from the ovary small cystomata, even dermoids, in cases in which a large tumor was present on the opposite side. Normal menstruation persisted, and in two instances pregnancy occurred.

Under no circumstances should an ovary be spared when the opposite one is the seat of carcinoma, papillary cystoma, or superficial papilloma, even when the organ is apparently perfectly healthy, since in most instances foci of disease will be found on microscopical examination. We are not yet in a position to affirm under what conditions small, benign tumors of the ovary impair the function of the healthy portion of the organ or to predict the possible dangers of a conservative operation in a given case.

Enucleation of Uterine Fibroid.—Lémoin (*Deutsche med. Wochenschrift*, 1898, No. 26) reports ninety-seven cases, with six deaths. The ages of the patients varied from twenty-six to sixty-seven years, the indications for operation being profuse hemorrhage or rapid growth of the tumor and deterioration of health. The author's technique is briefly as follows: After delivering the tumor through the abdominal wall each broad ligament is grasped in turn with forceps, divided, and then ligated. An incision is then made over the neoplasm, which is enucleated, and the cavity is closed with deep catgut sutures, the peritoneal flaps being sutured over the uterine wound, and the uterus is returned to the cavity, which is closed without drainage.

In the case of small tumors the vessels are not ligated, but the broad ligaments are clamped temporarily with forceps, the ends of which are guarded with rubber tubing.

All the patients who recovered remained in good health, six menstruated regularly, and one became pregnant and was delivered at full term.

Tumors Developing from Gartner's Ducts.—KLEIN (*Virchow's Archir*, Band cliv., Heft 1) reviews this subject at length, stating, as the result of his own studies, that the ducts begin in the parovarium, run in a curved direction through the broad ligament on either side to the uterus, penetrating the muscular wall of the organ to the os internum. In the portio they turn upward over the vaginal fornix and extend down the sides of the vagina to the hymen. The distal portions of the ducts may form glands and outgrowths (sprossen), analogous to the seminal vesicles in the male, while the paraurethral ducts correspond to the prostatic glands.

The persistence of Gärtner's ducts in the female is pathological, and from them may be developed both epithelial and fibro-muscular neoplasms, although this has not been positively demonstrated with regard to sarcoma and carcinoma.

Cysts of the ducts within the broad ligament can only be distinguished from parovarian cysts in their early stages. They may be papillomatous. In the muscular wall of the uterus, cysts, cystic adenoma, adenomyoma, and fibro-cysts may spring from the persistent ducts; pure adenoma, as well as adeno-carcinoma, has not been proved to have this origin. Vaginal cysts and adenomyoma develop in this way, also simple cysts of the hymen.

Malignant Adenoma of the Uterus.—KAUFMANN (*Ibid.*), from microscopical studies of a cancerous cervix removed five years after supravaginal amputation of a fibroid uterus, arrives at the conclusion that malignant adenoma, especially of the cervix, represents a distinct variety of cylindrical carcinoma, with a tendency to the formation of more or less perfect glands. The malignant character of the growth is shown by the polymorphism of the gland epithelium as well as the disposition to the formation of numerous layers.

So-called inoculation—metastasis in the vagina—usually represents direct extension of the disease. True metastasis by way of lymph-vessels or blood-vessels is more probable than the development of separate foci by inoculation. It cannot be denied, however, that raw surfaces may be inoculated during operation.

Restoration of the Urethra by Gersung's Method.—ROMM (*Centralblatt für Gynäkologie*, 1899, No. 8) reports the following case: As the result of a severe labor the urethra was entirely destroyed with the exception of the anterior wall, the opening into the bladder being buried in cicatricial tissue. The urethra was restored by a flap-operation, but incontinence persisted. The operation was repeated, and the canal thus formed was subsequently twisted around its long axis 180° from left to right, and fixed by sutures in its new position, a silver catheter with a similar twist being inserted in the bladder. At the end of two weeks the patient could retain her water for three or four hours at a time. A month after this operation the new-formed urethra was dissected out as far as the bladder and again twisted 180°, being sutured in such a way that the external opening was situated near the clitoris. A month later the patient had entire control of her bladder, both while lying and standing.

Primary Cancer of the Uterus.—D'ERCHIA (*Zeitschrift für Geb. und Gyn.*, Band xxxviii. Heft 3) calls attention to certain tissue changes in the uterus and adnexa in connection with cancer. Hypertrophy and hyperplasia of the uterine mucous membrane and connective tissue were frequently noted, and occasionally sarcomatous degeneration of the connective tissue of the cervix.

Extensive hyalin degeneration of the stroma and vessel-walls of the ovaries were common, and in one instance a small, metastatic nodule was found in the middle third of one tube. The practical deduction made by the writer was that the adnexa should always be extirpated with the uterus even in the early stages of cancer of the uterus.

Appendicitis and Salpingitis.—RONTIER (*Annales de Gynécologie et d'Obstétrique*, 1898, No. 12), in reporting a series of cases, emphasizes the difficulty in diagnosis between these two conditions, since there are no pathognomonic symptoms. When the two coexist it is not easy to determine whether the inflammatory process began in the appendix or in the tube. Since unilateral disease of the tube is rare, however, it is safe to infer that a tumor upon the right side is appendiceal. Moreover, when during the course of a cœliotomy the right tube alone is found to be diseased, the appendix should always be examined and removed if it presents a suspicious appearance.

Hernia of the Fallopian Tubes.—WIART (*Annales de Gynécologie et d'Obstétrique*, 1898, No. 12) reports a case of double congenital hernia of the tubes, found in the dissecting-room, in which there was no external tumor. The hernial sacs contained the distal end of the left tube and nearly all of the right, without the ovaries, thus supporting the theory of Cruveilhier that the hernia of the tube always precedes that of the ovary.

In the case reported the subject was an infant, aged two and one-half months, showing that the condition was undoubtedly congenital, while the hernia was inguinal rather than crural, contrary to the ordinary rule.

Fibroma of the Ovary.—LEVITZKY (*Ibid.*) reports two cases of pure ovarian fibroma. In one the tumor, weighing less than two pounds, had existed for eighteen years, but caused no symptoms until the patient had reached the age of forty-one. In the other, which weighed two and one-half pounds, the growths were first observed two years before operation. There was no ascites in either instance.

In spite of the benign character of ovarian fibroma, the writer urges the necessity of surgical intervention, on account of the tendency to sarcomatous degeneration.

Peritoneal Resorption.—NOETZEL (*Archiv für klin. Chirurgie*, Band lvii. Heft 2) concludes that the true significance of peritoneal absorption is the removal of part of the bacteria which are present. The peritoneal fluid is the principal agent in accomplishing this result, aided by the peristaltic movements of the intestines. Its bactericidal power is greater than that of any of the other serous fluids (Gewbssäfte). On the other hand, the peritoneum is exceedingly sensitive to irritation, whether mechanical, chemical, or thermic, and in consequence loses its peculiar power of disposing of bacteria. Toxins in particular inhibit its germicidal action. The practical deductions are the importance of avoiding septic infection and mechanical injury to the peritoneum during operation and the withholding of opium in order to favor peristalsis.

Cancer of the Cervix Uteri Following Supravaginal Amputation.—SAVOR (*Centralblatt für Gynäkologie*, 1898, No. 50) reports the following case: A woman, aged fifty-two years, had been operated upon four years before for fibromyoma of the uterus, the cervical stump being treated in the usual manner. Convalescence was protracted on account of the formation of a fistula communicating with the cervix. The patient applied for treatment on account of hemorrhages and a watery discharge. On examination the posterior lip of the cervix was found to be the seat of cancer, which had extended to the vaginal vault. It was extirpated with great difficulty, owing to the firm adhesion of the bladder and the atrophy of Douglas' pouch. The cervical mucous membrane presented a normal appearance, but the canal was obliterated for a distance of half an inch below the seat of amputation.

The writer refers to three other cases in Chrobak's clinic in which the cervical stump subsequently became cancerous; also to a fifth unreported case, and regards this as a strong argument in favor of pan-hysterectomy.

DERMATOLOGY.

UNDER THE CHARGE OF

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The Treatment of Lupus Erythematosus.—HEBRA (*Archiv f. Dermatologie und Syphilis*, Bd. xlviii., Heft 1), at the session of January 25, 1899, of the Dermatological Society of Vienna, presented two patients with erythematous lupus who had been treated with alcohol, and in both there had been a distinct retrogression of the disease. Where the disease was slight, as upon the ear and the cheek, it had completely disappeared; at the inner canthus, which was less accessible to treatment, the retrogression was less marked.

EHLERS (*Dermatologische Zeitschrift*, Bd. vi., Heft 2) presented two patients before the Danish Dermatological Society who had been treated with mercury in the form of Robin's pills, with favorable results. The composition of these pills is as follows:

℞.—Hydrarg. chlorid. corrosiv	1 grm.
Sodii chlorid	1 "
Vini thebaici	1 "
Micæ panis	5 grms.
Glutenis	2.5 "
Glycerini	2.3 "

M.—Ft. pil. 100.

One to two pills are given daily, at meal time, and notwithstanding the large dose of corrosive sublimate which they contain they are well borne. The effect upon the lupus is a remarkable one—redness, itching, and swelling of the eruption occurring very much as after an injection of tuberculin. After a couple of days the redness disappears, with abundant desquamation, and the disease begins to retrograde.

Eczema Treated by Röntgen Rays.—MACKEY (*British Journal of Dermatology*, April, 1899), at a meeting of the Dermatological Society of London, read notes of two cases of eczema treated by the Röntgen ray. The first case was a boy, aged eleven years, who had been repeatedly treated in the usual manner without marked benefit, the parts affected being the legs, arms, and cheeks. After treatment with lotions and salves for nearly a month, without improvement, the X-rays were used for ten minutes daily, at four inches distance. After a month of this treatment marked improvement was noted, the case being almost cured. The second case was a girl, aged thirteen years, who had had an eczema continuously for two years, the parts affected being the bends of the elbows and the region about the mouth. After sixteen applications of the X-rays, made as in the first case, the right arm was practically well, but the left one was still eczematous. It is important that the treatment be suspended if signs of irritation appeared.

The Treatment of Sclerodermia by Thiosinamin.—HEBRA (*Archiv f. Dermatologie und Syphilis*, Bd. xlviii., Heft 1), at a meeting of the Dermatological Society of Vienna, presented three cases of sclerodermia which had been treated by hypodermatic injections of thiosinamin. The first patient had received twenty-four injectons, and the skin, which in the beginning was tense and shining, had become approximately normal. In the second patient, after twenty-four injectons, the hard circumscribed area diminished in extent and resistance. In the third patient improvement was manifest after the fourth injection. Half a Pravaz syringeful of a 15 per cent. alcoholic solution was injected every second day in the interscapular region, the injections being made deeply, in order to avoid the production of superficial necrosis of the corium

Liomyoma Cutis.—C. J. WHITE (*Journal of Cutaneous and Genito-urinary Diseases*, June, 1899) reports a new case of this very rare affection. The patient was a man aged forty-five years, of American birth, who had always been in good health. The first tumor appeared upon the side of the lower jaw; after some months this was followed by others, until there were over sixty scattered over the right cheek and upper part of the side of the neck. The tumors varied in size from a pin's head to a large pea, the smallest being pinkish-red in color, the largest almost white, with a shining, flat, translucent surface. They were of firm consistency and non-compressible. The patient at times experienced great pain, sometimes coming on spontaneously, but always after the lesions had been subjected to pressure or when the face had been exposed to cold Microscopical examination of the tumors revealed a new growth of muscular tissue which had replaced almost entirely the normal corium. There was also a hyperplasia of bloodvessels and secondary degeneration.

Acute Circumscribed Œdema Associated with Hæmoglobinuria.—WENDE (*Journal of Cutaneous and Genito-urinary Diseases*, April, 1899) reports the following case: A man aged sixty-four years, in excellent general health, and of robust physique, suddenly experienced a feeling of tension in the skin of the dorsum of the right hand, which became markedly swollen, the swelling being firm and elastic, not pitting on pressure, and unattended by any change in the color of the skin. After twenty-four hours the swelling had subsided somewhat, but ten days were required for its complete disappearance, a recurrence accompanied by small swellings on the forearm and in the face having taken place during this period. The urine, which apparently contained blood, was found to be free from blood-corpuscles, but contained hæmoglobin. The day following the attack the blood appeared to exhibit a diminution in hæmoglobin, and a count of the red corpuscles showed a great decrease in number, there being only 3,520,000.

Lichen Annularis.—GALLOWAY (*British Journal of Dermatology*, June, 1899) reports an unusual form of ringed eruption occurring upon the extremities. The patient was an anæmic boy, aged ten years. Upon the hands, in the neighborhood of the joints, were several circinate patches with pale, ivory-like, elevated borders, the area of skin the centre of the patches being to all appearances normal, although it had previously been affected in a manner similar to the border. These lesions began as papules in the centre of the area affected, advancing by peripheral increase, always presenting a peculiar induration. They were distributed chiefly on the dorsal and lateral aspects of the joints of the hands. Microscopical examination of the lesions showed that they consisted chiefly of an infiltration of new cells into the cutis of the type seen in certain chronic inflammatory processes. The local use of salicylic acid, in a 2 per cent. to 10 per cent. ointment, and the internal administration of iron and cod-liver oil, were followed by the almost complete disappearance of the eruption.

The author concludes from a study of this case, and others resembling it, that there are certain chronic inflammatory conditions of the skin which produce lesions resembling lichen planus, due to poisonous substances of unknown nature in the circulation. In some instances gout and rheumatism may be the causes which produce this cutaneous affection.

PATHOLOGY AND BACTERIOLOGY.

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A Study of the Spinal Cord by Nissl's Method in Typhoid Fever, and in Experimental Infection with the Typhoid Bacillus.—NICHOLS (*Journal of Experimental Medicine*, March, 1899) says the changes in the motor-cells of the ventral horn and in the nerve-cells of the dorsal-root ganglia were studied in three cases of typhoid fever in man and in seven cases of experimental typhoid infection in rabbits.

Of the three cases in man all were severe infections. One died on the eleventh and one on the tenth day with perforation, and the third after an indefinite illness of about two months. In two cases the autopsy was made six hours after death, and in the third, fourteen hours, the bodies having been kept on ice. In all cases the typhoid bacillus was obtained in cultures made at autopsy.

In the ventral horn the cell changes were numerous, the most marked changes being in the lumbar region. The changes were an increase in size both of the cells and of the dendrites, a breaking apart and partial or complete solution of the chromatic substance (Nissl's granules), advancing from the region of the nucleus outward to the periphery of the cell, the granules being partly destroyed and diffused in the fluid of the cell, so as to form when precipitated a pale, blurred flocculent-looking mass. In some cases where this chromatolysis was most marked the nucleus had migrated to the opposite side of the cell. In these cells also the slightly enlarged dendrites were almost free from chromatic substance. Changes in the achromatic substance were slight.

The changes were most marked in the case of two months' duration.

[In view of the great variety of conditions which are said to cause alterations in Nissl's granules, it is surprising that the writer should unreservedly consider the changes in the cord of this case to be due to typhoid fever. The patient, a man aged sixty-seven years, with an indefinite history of two months' illness, died two days after entering the hospital. The clinical diagnosis was senile pneumonia. At the autopsy there was found a recent thrombus in the branch of the pulmonary artery supplying the lower lobe of the right lung, and solidification of this lobe, with gangrene and perforation of the visceral pleura, and resulting pyopneumothorax. The spleen was large and soft, but there were no intestinal lesions. Cultures from the solidified area in the lung, from the spleen, and other organs revealed the typhoid bacillus. The case is considered one of general infection with the typhoid bacillus without intestinal lesions. The influence of the chemical products resulting from the suppuration and necrosis in the lung the writer appears to have entirely overlooked. Although cultures from the lung showed only the typhoid bacillus, in the report elsewhere (Flexner and Harris, *Johns Hopkins Hospital Bulletin*, December, 1897, No. 81) of the case as an example of typhoid fever without intestinal lesions, the statement is made that "cover-slip preparations from the gangrenous lung and the pleural exudate showed bacillary forms of several kinds, including large coarse individuals not unlike certain putrefactive bacteria." That the marked changes in the cord of this case were due to the products of the putrefactive process in the lung as much as to the products of typhoid bacillus seems very probable.]

In the dorsal root the changes here were slight. They consisted in rarefaction of chromatin and changes in the shape and position of the nucleus.

In the experimental work seven rabbits were inoculated in the ear vein with bouillon cultures of the typhoid bacillus. The changes found were similar to those in man, being slight after two hours, marked after seven hours, and very extensive after thirty-three hours. In a rabbit killed after fifty-two hours there were practically no normal cells. The central form of chromatolysis was very prominent. Two rabbits which were partially paralyzed, and were apparently beginning to recover, were killed on the twenty-third and sixty-fourth days. In these it was thought that a process of restitution, as shown by a properly staining nucleus, and a typical arrangement of apparently newly-formed Nissl's granules was taking place.

In the prolonged cases a degeneration of the peripheral nerves (sciatic and its branches) was observed.

The writer concludes that the motor-cells of the ventral horn and the cells of the posterior root ganglia regularly undergo pathological changes in typhoid fever, and that changes in the peripheral nerves are common; and these changes are due to post-typhoid hyperæsthesias and paralysis.

The Bacteriology of the Accessory Sinuses of the Nose in Diphtheria and Scarlet Fever.—R. M. PEARCE (*Journal of the Boston Society of the Medical Sciences*, March, 1899) says, with the exception of Wolff, who in 1895 published the results of his examinations of the accessory sinuses of the nose in diphtheria, little attention has been paid to inflammatory conditions of these cavities as the result of the acute infectious diseases of children.

This is probably due to the small number of post-mortem examinations in this class of cases, and also to the difficulty of reaching the cavities. They can only be reached by sawing through the base of the skull (after removing the brain) and forcibly separating its two halves.

Pearce has carried out this method in fifty cases of diphtheria and scarlet fever examined post-mortem at the Boston City Hospital.

Thirty-nine of these were cases of diphtheria only, four were cases of scarlet fever only, and in the others the two diseases were coincident.

Of the entire 50 cases, inflammatory changes were found in 33. As would be expected, the antrum of Highmore was most frequently affected, the condition being bilateral in 23 and unilateral in 7. The sphenoidal sinuses were involved in 6 cases and the ethmoidal sinuses in 2. In most cases the exudate was purulent or seropurulent, but in a few was merely mucoid in character. The cases were almost exclusively among children, and the sinus disease was not suspected during life.

Bacteriological examinations were made in all cases. The diphtheria bacillus occurred in most cases, generally associated with the streptococcus pyogenes, the diplococcus lanceolatus, or the staphylococci.

Suppuration of the middle ear was very common in these cases, being present on both sides in twelve cases and on one side only in six. The bacteriological examination of the ear yielded results very similar to those obtained in the examination of the sinuses.

The writer believes an infection of the antrum of Highmore, with diphtheria bacillus, to be the explanation of the persistence of the bacillus in cultures from the nose after all membrane has disappeared. The antrum drains slowly, and if once infected with diphtheria bacilli, cultures from the nose would be positive until drainage had ceased or the bacilli had died out.

That these acute processes may lead to chronic sinus disease the writer considers very probable.

HYGIENE AND PUBLIC HEALTH.

UNDER THE CHARGE OF

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Poisoning by Meats.—Dr. Y. Boyer (*Lyon Médical*, May 14, 1899) records a case of sextuple poisoning from eating veal. The persons affected were members of one household, and ranged widely in point of age, the youngest being children of three and six years. The symptoms appeared in the night, about six hours after the food was taken, and began with vomiting and violent colic. In the morning all had intense gastric irritability, coated tongue, pain on pressure, especially in the right iliac fossa, rumbling, slight tympanites, and scanty urine. The cook had markedly dilated pupils, sensation of suffocation, constriction and dryness of the throat, and intense suffusion of the face. The child of six years had dilated pupils and disturbance of vision, and finally pain and stiffness of the muscles of the neck. The younger of the two children and the mother were less affected than the others, and made a more rapid recovery. The chambermaid had at first a certain degree of aggravation of symptoms, with a tendency to syncope and great muscular weakness, which latter effects were also marked in the case of the cook, who continued for some time to be troubled by dilatation of the pupils and disturbed vision. At the end of nine days there was no further appearance of danger, and the two most severely affected were well on the way to recovery.

Unfortunately no bacteriological examination was made either of the meat or the discharges, but the nature of the symptoms leaves no room for doubt as to their cause.

Another case in which five persons were affected is reported by DR. MEREDITH YOUNG (*Public Health*, June, 1899). Here the offending meat was three-quarters of a pound of "pig's cheek," which was eaten at half-past four in the afternoon, between which time and the onset of symptoms nothing else was eaten. On the following morning Mr. A. was seized suddenly with vomiting, purging, and severe abdominal pain, and shortly afterward became very feverish and weak, and suffered from severe frontal headache. His wife had severe abdominal pain, and toward noon was strongly purged. She suffered nausea, retched, but could not vomit; had fever and severe headache, and was much more prostrated, and took more time to recover than her husband. She was unable to take food for three days. Their daughter was taken sick at the same time and with the same symptoms, though less severely. Her chief symptom was a strong and overpowering tendency to sleep. A fourth person, who ate but little as compared with the amounts ingested by the others, was slightly purged, but suffered nothing more. The remaining member showed no effects until during the second night. On the following morning she was feverish, had severe headache and abdominal pain, and retched unsuccessfully. Purging did not occur until the afternoon. As was the case with the daughter, the most prominent symptom after the onset was somnolence. Recovery followed in every case. Investigation showed that the cheeks had been cooked two days before, and had been placed together to cool and "set." It was estimated that between fifty and sixty persons had purchased of them, but all but a small proportion were unknown to the seller, and so no systematic inquiry could be made. Four only could be followed up, and two of these reported no trouble; a third was made severely sick and lost two days' work, and the fourth, after eating, drank so much beer that he was made sick and lost it all by vomiting, and yet was affected like the others, but not so actively. In this set of cases, too, it was impossible to procure any of the meat or vomited matter or dejections for bacteriological examination.

A much more extensive outbreak, involving nearly fifty people, one of whom died, is reported by DR. W. SILBERSCHMIDT (*Zeitschrift für Hygiene und Infectionskrankheiten*, xxx. 328). This was due to a kind of sausage known in Switzerland as "Landjäger" (gendarme). It is made of beef, often, also, horsemeat, with pig fat. The materials are chopped rather coarsely, spiced, put into casings, pressed flat for a day, smoked two days, dried in the air several more days, and then eaten in the raw state. The particular sausages in this instance were made of cow beef, from animals that had been certified as sound by the veterinarian, and pork that had been bought about two weeks previously and kept with preservative salt, and had appeared quite fresh and unchanged when used. In the morning of the first day when the sausages were on sale a man and his wife ate one of them together, and both were made so sick toward evening and during the night that a physician was called. In the afternoon of the same day nineteen fishermen ate of them, and on the following day it was reported that all of them had been made sick. In the evening another man ate one, and it pleased him so much that he took another home to his wife and children. On the next day he had abdominal pains, headache, vomiting, diarrhœa, thirst, and a chill. In the afternoon his wife and his two children that had eaten were similarly seized. A boatman who ate two whole sausages suffered no inconvenience beyond a little pain on the following day. Another, who was sick eighteen days, and then returned to his work, was seized again ten days later with the same train of symptoms.

One young man, aged eighteen years, entered the hospital in the morning of the second day, and died during the night, two days and a half after ingestion of the sausage. At the time of entrance the abdomen was sensitive, and he was passing grayish watery stools; in the afternoon he was delirious, and his pulse was very small, irregular, and rapid. During the night he collapsed and died. Section after twelve hours showed a spleen of normal size, swollen mesenteric glands, and hyperæmia of the stomach and intestines. The follicles were much swollen, and in the ileum were several areas from 4 to 6 cm. in length by 1 cm. in breadth, where the mucous membrane was discolored and eroded. Other organs were normal. Six others of those affected were discharged from the hospital after from seven to fifteen days' treatment.

In an adjoining town, where sausages of the same lot were sold, there were sixteen other cases, all with the same symptoms. Taking all the cases together, the symptoms of prominence were as follows: Very severe, partially crampy, abdominal pains; very profuse diarrhœa, the stools numbering from eight to twelve per day, and in color varying between gray, greenish, and yellow; usually vomiting, the rejected matters being watery and brownish; sunken eyes, high fever, great lassitude, tenderness over abdomen, cramps in the calves, great thirst, and, occasionally, meteorism. In most of the cases the symptoms appeared on the day after eating. The duration of the illness ranged between one and thirty days, the greater number recovering in two weeks, and becoming fit for work in three.

As is commonly the case in these food outbreaks, the attention of the authorities was not drawn to the matter in either town until some days had elapsed. Chemical analysis of unused sausages were made at both places. One analyst reported negative results; the other reported the presence of ptomains, but did not further particularize. Bacteriological investigation revealed the presence of a variety of organisms, as was to have been anticipated, and among them, especially marked, *proteus vulgaris*, but no specific pathogenic bacteria were found.

Silberschmidt calls attention to the fact that the smoking to which the sausages had been subjected, while not destructive to the bacteria of putrefaction, was successful in masking any unpleasant smell or taste due to the process, and urges the warning of the public against eating smoked sausages in the uncooked state. In this case there was nothing to indicate that the animals from which the meat was derived were not in a perfectly healthy condition.

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THE SURGICAL TREATMENT OF TUMORS WITHIN THE SPINAL CANAL.[1]

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The recent studies into the subject of spinal tumors by Bruns, of Tubingen,[2] and by Schlesinger, of Vienna,[3] have been so thorough and so searching, and have so ably carried forward the earlier researches of Horsley, Starr, Sherrington and many others, that it will be long before they are displaced, and seldom that new generalizations of importance will be added to theirs. Schlesinger alone reports fifty-six new cases, and summarizes four hundred, of which one hundred and four come from the post-mortem records of the Vienna General Hospital, which described a total of thirty-five thousand autopsies. All cases are excluded from Schlesinger's list, except where it was expressly stated that the spinal cord was involved, and extradural granulation-growths are not ranked as tumors even when they compressed the cord.

In spite of this array of tumor cases, the number of actual operations is still so small that additional records still have clinical lessons to teach.

The first patient to whose case I shall refer was a lady, aged fifty-two years, whose symptoms, which were very serious, proved to be due to a distinct and easily removable intradural fibroma. The first signs of her illness showed themselves in the early part of 1897, in the form of severe pain, occurring intermittently at first, but in more and more frequent attacks, over the lower ribs and the left side and down across the abdomen into the left groin. Even a year or two before this she had had an attack of severe pain in the abdomen, for which no cause could be assigned, and which may have been connected with the growth of the spinal tumor; but this had been followed by a prolonged free interval.

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[1] Read at the meeting of the Association of American Physicians, May, 1899.

[2] Die Geschwülste des N. Systems, 1898.

[3] Beiträge zur Klinik des Rückenmarks und Wirbeltumoren, 1898.

In March, 1897, she consulted Dr. R. H. Fitz, whose notes say that the pain was in the region of the transverse colon at first, later in the direction of the descending colon. At that time he saw no reason to ascribe the pain to anything more than neurasthenic and digestive disorders. That summer she went on a driving journey, and this is interesting, because the fact that the jolting of the carriage over country roads did not increase the pain helped later to the conclusion that the vertebral column had not been primarily involved. It must, however, be admitted that even in cases where jolting does cause pain we should not be justified in concluding that vertebral disease is present, for in the second case that I shall describe, which is one of intramedullary tumor, that sign was present to a striking degree.

In July of 1898—that is, about six months after the first onset of the pain in a definite form—the patient began to notice difficulty in using the left leg, especially when she was obliged to raise the weight of the body onto the step of a carriage or in going up stairs. This is still her greatest difficulty. Slowly but steadily the pain and weakness increased, and it is a noteworthy fact that the former seemed to be closely associated with the condition of the bowels. Not only was the pain made worse by the effort attending an evacuation, which, as has been suggested by Lacquer, may increase the congestion of the intravertebral veins, but the presence of gas in the bowels caused her great distress, and the periods shortly before and shortly after a movement were especially painful times.

Increase of pain in connection with intestinal movements or constipation has been repeatedly noted in cases of this sort, but with our patient it was a striking feature. The very presence of the gas which seemed to cause her so much distress was perhaps due to a paralytic condition of the bowel-walls. In the report of Ransom and Thompson's case, it is stated that the pain was not worse after breakfast or dinner, but was worse after supper, " when he had some wind."

Slight movements of the head, especially toward the left side, and even opening the mouth widely, would also bring on severe pain. It is impossible to believe that the slight contraction of the dorsal muscles required for these movements could, in itself, have disturbed the inflamed nerve-roots to any considerable degree, but for any one who has studied the neuroses dependent on association, it is quite easy to believe that a faint hint of possible further irritation, such as might attend really extensive movements of the vertebral column, could be given by these slight contractions, and would suffice to precipitate an explosion of pain.

In February, 1898, the patient consulted Dr. R. W. Lovett, literally crawling into his office, in the midst of an excruciating attack of pain which bent her double. From that time even to the present the bent-over position of the body has been assumed as the easiest one, and movements of standing still give rise to more or less discomfort, as they did then to intense pain. All through the spring of 1898 movements of every sort, and also the supine position, were very painful.

She was first seen by me in consultation with Dr. Lovett in the early part of June of the same year. At that time, although she looked in blooming health, she could walk only a few tottering steps, and not even those unassisted. The knee-jerks were greatly exaggerated, the left more so than the right, and ankle clonus was present. The sensibility to touch and pricking, which had previously been almost normal, was slightly, but only slightly, impaired over all the anterior surfaces of the legs and the lower part of the abdomen. At that time the pain, which had been most severe in the neighborhood of the groin, was most severe over the left flank and lower ribs, especially in the axillary line, where pressure was painful, as is indeed still the case.

The diagnosis of tumor at once suggested itself, as it had already to Dr. Lovett, and the question of operation was canvassed; but as she seemed to improve slightly, it was not decided upon until a few weeks later. Dr. Lovett had by that time been obliged to leave Boston for Europe, and left the patient in my charge, with the request to call in Dr. Warren to operate, if necessary, and this I shortly afterward decided to do.

Meantime, the impairment of sensibility and motion had increased until, at the time of the operation, the patient was unable to stand alone, and had begun to have considerable difficulty in controlling the bladder.

A careful examination as regards the sensibility, made three days before the operation, showed a very considerable impairment in the entire area of the distribution of the lumbar nerves—that is, over the anterior and lateral surfaces of the thighs, legs, and feet, although not everywhere to quite the same degree. This area of strongly marked impairment ceased abruptly at the groin on both sides, but slight impairment was observable over the whole abdomen, shading off gradually and finally disappearing at about the epigastric fold. On the whole, the sensibility of the left leg was distinctly better than that of the right, while the loss of motion there was much greater, a fairly certain indication that the left half of the cord had been invaded. Posteriorly, the impairment of sensibility was very much less, both as regards the buttocks and perineum, the back, and the thighs. It was, in fact, only on careful tests that any impairment was discovered in these areas. The umbilical reflex was entirely absent for the left side, but was faintly present at the first trial on the right side. In the affected areas the sensitiveness to pricking, temperature, changes of position, and contact were all involved, though not everywhere uniformly.

The character and sequence of symptoms were typical of tumor, consisting, as they did, first in pain, presumably due principally to nerve-root irritation, then in signs of cord pressure, causing impairment of sensation and motion, beginning in the toes and following, to some extent, the "Brown-Séquard" type.

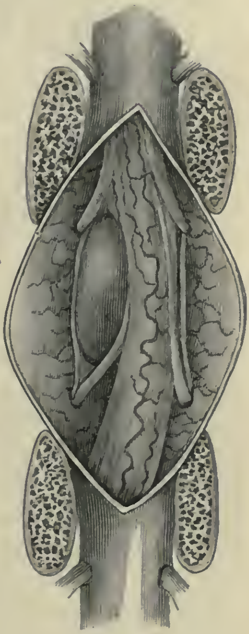
The course of the disease, the fact that pain had been felt over the lower ribs, and that the impairment of sensibility, though slight, was observable as high as the area of the ninth dorsal, coupled with the fact that the patient had never shown any signs of other malignant growths, or of vertebral disease, made it reasonable to hope that we had to deal with an extramedullary tumor, not primarily involving the vertebral column, and situated as high as the ninth dorsal segment. The high degree of exaggeration of the knee-jerks and the presence of ankle clonus, taken together with the fact that the sphincters had not been involved, early or severely, and that the area of distribution of the sacral nerves was relatively free from signs of impaired sensibility, made it evident that the growth did not seriously involve the lumbar enlargement.

Dr. Warren gives the following account of the operation:

An incision six inches long was made from the seventh dorsal to the first lumbar spines. The muscular mass was rapidly dissected off on each side from the spines and the transverse processes, and held back by a broad retractor devised by Dr. R. B. Greenough. Hemorrhage was controlled by gauze packing so effectually that it was found at the end of the operation that it had not been necessary to tie a single ligature. The spines of the lower four dorsal vertebræ were next removed with cutting forceps, and the laminæ of the tenth and eleventh vertebræ were cut away, disclosing the dura but showing nothing abnormal. On removing the laminæ of the ninth dorsal vertebra a swelling was noticed in the cord beneath, which gave to the touch of the finger a marked sense of resistance. On laying open the cord at this point by an incision about one inch in length, a tumor about the size and shape of an olive was disclosed lying in the meshes of the pia on the left side. So loose were its adhesions that it was readily removed by the gentlest of movements with a blunt instrument, and with the slightest possible hemorrhage, which was controlled by a gentle pressure of a few moments' duration. No pedicle was found. The dura was stitched with three silk sutures. The muscles were brought into apposition by a few buried silk sutures, leaving a space for a temporary gauze drain. The skin was closed with silkworm-gut, two provisional sutures being left at the point of drainage. A dry dressing was applied.

During the first days after the operation the paralysis of both sensation and motion was intensified, and a zone of hyperæsthesia, such as had not been observed before, covered the abdomen and lower part of the chest, making the re-application of bandages a very painful process. These results we attributed to the œdema and the disorders of nutrition following the great change in vascular tension. Slight and vague sensations in the legs were felt on the second day, but the first sign of voluntary motion, and that only of the very slightest, showed itself three days later, and improvement in this respect was extremely slow. The bladder and rectum were not fully under voluntary control for many weeks, and not at all for the first three weeks.

The distress and pain induced by the helplessness, the hyperæsthesia of the abdomen, the constantly recurring cramps of the muscles of the thighs, legs, and feet, made a good deal of the first month a trying period, though it did not pass without frequent indications of better things to come. Perhaps even the strange illusions and hallucinations as to the position of the legs and feet, and with regard to movements, with which she was constantly harassed, were in reality signs of promise.



It was noticeable that, as in the Gowers and Horsley case, some of the early efforts at voluntary motion excited a spasmodic contraction, or a movement that seemed such to the patient, though it was in fact a mixture of voluntary motion and spasm.

The first return of perspiration to the legs, which had hitherto been wholly dry, showed itself after several weeks, the moisture being at first confined to the popliteal space, then affecting those surfaces of the legs which were in contact with each other.

It is always instructive to note how the spinal centres in spite of long disuse and serious injury may retain their power of recuperation, but this was still more strikingly shown in the first case of Gowers and Horsley than in ours. Their patient, who had been wholly paralyzed for months before the operation, and remained so for a month after the operation, was able at the end of a year to walk three miles.

The case recently published by Eskridge is in almost every particular a counterpart of the one here reported, but there, also, the improvement was more rapid.

On the whole, the history of the case since the operation has been one of slow but almost uninterrupted gain. At the present time the patient can walk fairly well with a cane, and short distances alone. Mounting the stairs or stepping into a carriage is very difficult without assistance from behind, but would doubtless be easier were the patient not so very stout. The body was for a long time bent strongly forward during attempts to stand and walk, but in this respect she has improved, though she has not wholly recovered. Every movement is possible, and most of them are fairly strong. She still has a good deal of pain from time to time, especially in the back and sides, but I am persuaded that to some extent these pains are due to association and habit, and persist mainly as an echo of the former condition.

A careful examination of the sensibility shows a very slight impairment, in all modes, over the greater part of the legs and abdomen, and even as high as the sixth rib in front; but, as before, there is hardly any impairment in the areas of distribution of the lower sacral nerves. There is still tenderness on pressure over the lower ribs in the axillary line, but this, too, I am inclined to attribute to the reviving of former associations. There is slight hyperæsthesia over the abdomen, as a reminder of the time when this was so great that the arranging of the bandage after the operation was a source of great distress. Her greatest discomfort is, however, a sensation of tension in the feet, causing a sense of "pulling" in the soles, and giving her a feeling as if the toes were being drawn upward, and until recently this has been associated with an actual hyperextension of the toes. Indeed, even now an effort of the will is sometimes required to overcome it. The knee-jerks, which remained extremely exaggerated for six months or more after the operation, have now become nearly normal, and ankle clonus has disappeared. Micturition is normal. The catamenia, which was absent for two or three months before the operation, has now become normal.

The points in which the case seems especially instructive are the following: The first is the wide extent of area over which pain was at times felt, which embraced the whole zone on the left side, lying between the groin, up to which point the loss of sensibility seemed to be almost complete to the epigastrium.

One must assume that the pain in the neighborhood of the groin was due not to the irritation of the nerve-root having its main distribution at that level but to that of a nerve-root given off one or two segments higher up, but reaching down to the point in question, for it is impossible to believe that this tumor could have extended down as far as to the origin of the twelfth dorsal root; and all the facts are fairly well accounted for if we accept the views of Sherrington, adopted by Bruns, that every given area on the trunk is supplied with at least three overlapping nerves.

Another point of interest is that the abdominal pain, even from the outset, was increased by the evacuation of the bowels, and by distention with gas. I was at first inclined, as stated above, to attribute this to increase in the abdominal pressure interfering with the spinal circulation, but it seems to me now more probable that the pain was a referred sensation, occurring on the principles laid down by Head as the outcome of his well-known researches. Most of the cases which Head studied were examples of pain excited by the stimulation of a normal spinal cord through excitations arising from diseased viscera, while in cases like the present we have, perhaps, an example of practically normal visceral excitations translated into painful cutaneous sensations, in consequence of the abnormally sensitive condition of the cord at certain levels.

Another significant fact is that the sensibility in the area of distribution of the sacral nerves was so much less affected than that in the distribution of the lumbar nerves. This seems, to judge by the reports, to be a common occurrence in cases of dorsal tumors. It was noted by Starr in one of his cases, and is especially commented on by Eskridge, who thinks it may be a mark of value in the differential diagnosis of tumor paralysis and Pott's paralysis. For the present I record the fact without offering an explanation, though I think that one is needed.

Finally, I would call attention to the fact that the patient, though greatly improved, and able to walk slowly without the aid of a cane, and free from any considerable pain, is yet far from well. Her present condition still mirrors the distresses both of the time before operation and the convalescence.

The two cases which I have next to report may, I hope, bring encouragement to those who are inclined to operate, even where no radical cure is to be expected.

The first case is apparently one of endothelioma of the spinal cord itself, which has been causing symptoms already for nineteen years. The patient is a gentleman, now forty-three years of age, who was seized in 1880, while in robust health, with intense pain in the lumbar region of the back, from which he remained a great sufferer for the next two years. It is noteworthy, in connection with the fact that the tumor probably started from the pia, that the jolting of a carriage greatly increased the pain. At the end of a little more than one year signs of compression or injury of the spinal cord first showed themselves, in the shape of impairment of sensibility to contact, and apparently to changes of position, and slight impairment of motion, in the feet, while at the same time the pain diminished and finally disappeared. The spinal cord symptoms continued to progress, until at the end of about nine years he became entirely paralyzed as regards sensation, motion, and control of the bladder and rectum.

In the intervening period the interesting dissociation of sensory symptoms showed itself, which was for a long time thought to be characteristic of intramedullary growths or syringomyelia, but which is now known to be the occasional result of pressure and other lesions. At a time, namely, when he could barely distinguish hot from cold water, and when only deep pricks caused pain, he could feel a fly walking upon the skin.

Some years after the paraplegia had become complete the patient's general condition grew so much worse that chances of relief were eagerly sought for. The cause of this state could not be positively ascertained, but he had lost much weight, his face appeared dusky, and he suffered greatly from frequent recurrences of singular attacks of sudden chill, followed by fever and sweating, of one, two, or three days' duration, which had occurred at intervals for a number of years, and have, indeed, continued to occur, though much less frequently and with much less severity, up to the present time. It was ascertained by careful investigation that these attacks were not of malarial origin, and the most probable alternative diagnoses seemed to be urethral infection or some influence starting from the spinal disease.

Although it was recognized as quite possible that the new growth, which was obviously present, lay within the cord itself, still the chance of an extramedullary tumor could not be wholly excluded, as will be readily conceived by any one who has made a careful study of the data on which these diagnoses are based. Therefore, after consultation with Drs. Walton, Keen, and Warren, and by letter with Dr. Mills, of Philadelphia, an operation was decided upon, and was performed by Dr. Keen, in 1891.

The cord was found enlarged, and dark-gray or bluish in color, and as no sign of external disease was present, the wound was sewed up. The recovery from the operation was steady, and convalescence was no sooner fairly established than the patient's general health, strength, and flesh began to improve, so that he has been in all respects markedly better ever since. Indeed, at the present time, though the new growth has obviously invaded the cord as high as the lower cervical region, he is in excellent physical condition, and the fever turns are of rare occurrence.

The favorable state of affairs following this operation was temporarily interrupted in 1895, when he suffered for a number of months with severe grinding pain across the neck and shoulders and in the arms, evidently due to the irritation of the new growth. This was relieved at first by applications of heat and ice, and he then remained free for more than a year. In December, 1897, however, the same pain returned, with increasing intensity, and grew steadily worse, so that toward the end of January it precluded sleep and became intolerable. After all measures that could be suggested had been tried in vain, I proposed to his physician, Dr. George Washburn, that another operation should be undertaken, at the site of the previous one, with a view of allowing cerebro-spinal fluid to drain off for some time, in the hope that changes in circulation and pressure might be induced which would at least break off for a time the habit of pain, for, as every one who is familiar with the treatment of neuralgias knows, the effect of habit counts for much in maintaining pain, and, on the other hand, a change of "set" of the nervous currents often serves to relieve it. The suggestion was an empirical one, but the result seemed to justify it. The operation was performed by Dr. Warren, who gives the following account: On February 10th the upper portion of the cicatrix was incised and the arches of the seventh, eighth, and ninth dorsal vertebræ removed. The cord at the seat of the old cicatrix was much thickened, and appeared like a soft sarcomatous tissue. Probing failed to reveal any collection of fluid. A gauze drain was left in and the wound was closed. The sinus formed by this drain closed in about two weeks, after the discharge of considerable cerebro-spinal fluid. A small bed-sore was easily controlled. An irritable spasmodic stricture caused some trouble at first, on the passage of the catheter, but finally yielded.

The patient never had another untoward symptom, except that for one week after the operation the numbness of the fingers of the left hand, by which he had been occasionally annoyed, increased. This, however, soon diminished, and is now less than before the operation. The pain ceased at once and has never returned.

The spinal cord at the point operated on seemed to have been converted into a dark-colored mass, not suggesting in any respect the normal cord. A piece of it which was excised, and afterward examined microscopically, proved to be made up of a mass of small round cells, probably endotheliomatous in nature. [Examination by Dr. E. W. Taylor and others].

The third case is of interest, from the relatively favorable outcome of operation in a case essentially incurable, and also because it is one where a sarcomatous growth seems distinctly to have been initiated by injury.

The patient, who at the time of my examination was a young man, aged twenty-four years, had had, three years before, a severe fall from a ladder, in the course of which his neck received a severe wrench, followed by stiffness and impairment of movement to the left, due, as I am inclined to believe, to a partial dislocation. He was able to return to work after six weeks, but in the two subsequent years his neck was injured twice again. Six to eight months before I saw him he began to have difficulty in walking, then in the use of his hands, although, strangely enough, disorders of sensibility, either subjective or objective, have been trifling from first to last. The knee-jerks and wrist-jerks became exaggerated, and ankle clonus soon developed. Both legs and arms became wholly paralyzed, with the exception of trifling movements, and gradually the breathing became affected, so that eventually it was possible only through the diaphragm and accessory neck muscles.

When matters arrived at this point, and death seemed inevitable, he consented to an operation, which I had already advised. I had felt a prominent vertebral body in the pharynx, and believed it probable that he was suffering from caries of the upper cervical vertebræ, with extradural cord compression; but it should be said that my colleague, Dr. G. L. Walton, was less inclined to favor this view than that of sarcoma, which proved to be the correct one.

The operation was done by Dr. J. W. Elliot, on June 20, 1898. The posterior surface of the axis was found eroded, and on breaking it away with the forceps a sarcomatous mass was found beneath, which apparently penetrated directly to the spinal cord. This was removed and its base curetted, and the surrounding parts, which seemed also to be infiltrated by new growth, were cleared up as far as possible. The growth was pronounced by Dr. W. F. Whitney a giant-cell sarcoma.

The patient's breathing improved at once, and after a few days the voluntary motion began to return to both arms and legs. He left the hospital in three weeks much relieved, though still unable to walk alone. This improvement was soon followed by a relapse to a certain degree, but this again by renewed improvement some weeks later. Since then he has been gaining steadily, and is still gaining. An examination made within a month finds him in good flesh and color, breathing without effort, free from pain. He has no subjective impairment of sensibility consequence, and a careful examination shows that the sense of contact, temperature, pain, and position is almost but not quite normal below the neck. The breathing is still mainly diaphragmatic, but the costal muscles also act.

Almost all motions of both arms and legs are possible, and though weakness and rigidity and spasm still incapacitate him from getting about alone, he is able to do many things for himself, and looks forward, with apparent justice, to further improvement.

The number of the operated cases already published has increased from the twenty reported by Bruns, in 1898, to thirty three, which have been collected for us by Dr. Robert B. Greenough, who assisted Dr. Warren at both of his operations, and to whom we take this occasion to express our appreciative thanks. This list does not embrace the five cases of pressure paralysis following Pott's disease, which were included by Starr in his table, nor Starr's own case of extradural tubercular tumor. It is true that these cases differ from the great majority of the Pott's paralysis cases, in that the pressure was exerted by thick masses of organized tissue-forming tumors on the dorsal surface of the dura; but, nevertheless, it seemed to me that a consideration of them would open the large subject of Pott's disease, upon which we could not enter.

Of the thirty-three operations reported in the table, seven led to recovery and ten to more or less improvement, although only in five of these latter, amongst which our first case was included, was the improvement considerable or lasting.

Among the cases reported as "recovered" there are two where the records are not sufficiently perfect to allow of verification of the statement. In one other case (Davies-Colley) the tumor removed was a sarcoma, so that although the patient was able to return to work the eventual outcome is perhaps uncertain.

In ten, perhaps twelve, cases operation seems to have hastened death, which occurred five times through meningitis, septicæmia, or hemorrhage (once, in a case of epithelioma); five times through shock, exhaustion or other causes. It is fair to believe that with improved methods of operation and diagnosis the danger from some of these agencies would diminish, but at the worst the figures show but one out of three chances for hastened death against even chances for some improvement.

In nine cases the operation seems to have made little difference in the progress of the case, and it should be remembered that even with the others the death which was hastened was bound to occur soon at any rate.

The really satisfactory cases for permanent or complete recovery or substantial improvement are few in number. The best results were in the three fibroma cases, in one, each, of psammoma, lipoma, and sarcoma, and in two of echinococcus. The occurrence of the two last fibroma cases (Eskridge and Freeman's, and ours), so near together might suggest that they are of frequent occurrence, but in fact they are separated by twelve years from that of Gowers and Horsley, which was the first successful case ever reported, and which did so much to stimulate the surgeon's hope.

It is interesting to note that in spite of the difficulty—or impossibility in some cases—of deciding positively as to the exact position of a tumor, or even whether it is inside or outside the cord itself, no case *has been reported* where an operation was done on a wholly mistaken diagnosis. In one case, however, the tumor was missed because it lay above the incision, and in another, contributed by Bruns himself, a growth which was supposed to be extramedullary proved eventually to be a diffuse sarcomatous infiltration of the roots and outer portions of the cord.

SPINAL TUMORS OPERATED ON.

No.	Reporter.	Reference.	Date.	Tumor.	Height.	Situation.	Result.
1	Bruns and Kredel.	Arch. Psychiatrie, Bd. xxviii.	1892	Sarcoma.	9 D to lower lumbar	Intra-dural.	Death.
2	Bruns and Lindemann.	Neurol. Centralbl., 1894, p. 359.	1894	Sarcoma.	3 to 6 D	Extra-dural.	Death in 1 day.
3	Church and Eisendrath.	Amer. Journ. Med. Sci., 1892, p. 395.	1890	Spindle-cell sarcoma.	4 to 5 D	Intra-medull.	Death in 4 days.
4	Clark.	Brain, 1895.	......	Endothelioma.	Lower C	Extra-dural.	Death from hemorrh'ge
5	Curtis.	New York Record, March 5, 1898.	1898	Cancer.	6 D	Extra-dural.	Death in 16 days.
6	Davies-Colley.	Clin. Soc. London, 1892, p. 163.	1892	"Fusiform" spindle-cell sarcoma.	5 to 6 D	Extra-dural.	Recovery.
7	Eskridge and Rogers.	Phila Med. Journ., Feb. 19, 1898.	......	Tumor of vertebræ.	4 to 5 D	Extra-dural.	Death in 9 days.
8	Eskridge and Freeman.	Phila. Med. Journ., Dec. 10, 1898.	1897	Fibroma.	3 to 4	Intra-dural.	Recovery.
9	Gerster.	N. Y. Med. Journ., 1892.	......	Sarcoma.	5 D	Intra & extra-dural.	Improvement.
10	Gowers and Horsley.	Med. Chir. Trans., 1888, p. 407.	1887	Fibro-myxoma.	3 to 4 D	....	Recovery.
11	Horsley.	Brit. Med. Journ., 1890, part II.	......	?	....	Intra-dural.	Death in 1 day.
12	Horsley.	Clin. Journ., Lond, 1896–97, ix. p 177.	......	Echinococcus.	(3L n'rve) 12 D V	Extra-dural.	Recovery?
13	Ignatoff.	Vayenno Med. Journ., St. Petersburg, 1896, I sect. cixxxvii. pp. 30–32.	1894	Chondrosarcoma.	5 to 7 D	Extra-dural.	Improvement.
14	Kümmell.	Arch. klin. Chir., 1895, Bd. l.	1893	Sarcoma.	3 to 4 D	....	Improvement.
15	Lichtheim and Mikulicz.	Deut. med. Woch., 1891, p. 1386.	1890	Psammoma.	9 D	Intra-dural.	Death in 2 days.
16	Lichtheim and Mikulicz.	Deut. med. Woch., 1891, p. 1386.	1890	Psammoma.	4 D	Intra-dural	Marked improvement.
17	Lloyd.	Amer. Med. Surg. Bull, New York, 1896, x. p. 659.	1896	Echinococcus.	8 D to 5 L	Extra-dural.	Recovery.
18	Laqueur and Rehu.	Neurol. Centralbl., 1891, p. 193.	......	Lymphangioma.	Sacrum	Extra-dural.	Marked improvement.
19	Munroe.	To be published later.	......	Sarcoma.	Lumbar	....	Death.
20	Pescarolo.	La Riforma Med., 1892, X. Internal. Cong., Berlin, iv. p. 59.	......	....	2 to 5 D		
21	Putnam and Elliot.	....	1899	Sarcoma.	2 and 3 D	Cerv. vert.	Improvement.
22	Putnam and Warren.	....	1899	Fibroma.	9 D	Intra-dural.	Great improvement.
23	Quensel and Garten	Neurol. Centralbl., 1898, xvii. p. 482.	1896	Sarcoma.	7 to 8 D	Extra-dural.	Death in 6 days.
24	Ransom and Anderson.	Brit. Med. Journ., 1891, ii. p. 1144.	......	Echinococcus.	10 D	Extra-dural.	Death in 3 days.
25	Ransom and Thompson.	Brit. Med. Journ., 1894, i. p. 395.	......	Round-celled sarcoma.	8 D	Extra-dural.	Death in 6 days.
26	Roy.	N. Y. Med. Rec., 1890, ii. p. 564.	1890	?	9 to 12 D	Intra-dural.	Recovery.
27	Sänger and Krause.	Munch. m. Woch, 1894, p. 22.	1894	Sarcoma.	6 D	Extra-dural?	Death in 4 days.
28	Sonnenburg.	Verh. deut. Gesell. Chir., 18th Cong., Berlin, 1889.	......	Sarcoma.	Lower D	Extra-dural.	Death in 6 weeks.
29	Starr and Abbe.	N. Y. Med. Rec., 1890, p. 85	......	Sarcoma.	8 to 9 D	Extra-dural.	Death in 9 days.
30	Starr and McCosh.	Amer. Journ. Med. Sci., June, 1895.	......	Sarcoma.	5 D (7 D)	Extra-dural.	Death in 21 days.
31	Starr and McCosh.	" " "	......	Lipomata.	Lumbar	Extra dural.	Imprvem't; death in 6 mos from upper dorsal caries.
32	Szekeres.	Pester Med. Chir. Presse, 1894, p. 43.	......	Echinococcus.	....	Extra-dural.	Recovery.
33	Welms and Trendelenburg.	Beitr. z. klin. Chir., 1898, xxi. p. 151.	1896	Echinococcus.	2 L to sacrum	Extra-dural.	Death in 6 mos. from amyloid.

A few cases—not operative—are on record where the diagnosis, though carefully made, proved wholly erroneous.

How large is the surgeon's field for operation in the spinal canal? This is a question which the physician has to consider, in view of the great uncertainty which must attend his diagnosis as regards the exact position of the tumor—namely, whether it lies dorsally or ventrally with relation to the cord. The possibility of drawing the cord aside to a certain extent, cutting one or two dorsal nerve-roots, if necessary to accomplish it, has been contemplated by various surgeons. In fact, Kümmell[1] removed a laterally-placed sarcoma of the body of a vertebra and scraped out the cavity, but no tumor has, to my knowledge, been removed from the ventral portion of a vertebral body.

It is an important inquiry how nearly, in the cases which are counted as successful, such as the first of those reported by us, the improvement is likely to approach absolute recovery; to what extent the degree of probable improvement may be foretold; and what signs make its occurrence improbable.

Very few cases are actually at our command—if we omit those of Pott's disease—for answering this question. In most of the cases that ended in recovery the paraplegia had been complete but for a very brief period, but in the Gowers and Horsley case it had existed for several months. In Pescarolo's[2] case, where the patient had been paralyzed for some years, there was no improvement at the end of five months after operation. No one need be disappointed at the occurrence of a temporary increase of paralysis after operation, or at a delay in the onset of signs of improvement. Some return of sensibility is likely to show itself by the end of a day or two at the latest, but no voluntary motion may occur for one or two weeks. The earlier movements, as in the Gowers and Horsley case, and in ours, although initiated by voluntary effort, may seem to the patient, and at first to the physician, to have all the character of involuntary spasm.

It is probable that, as a rule, the prospect is better in the cases where the paralysis develops slowly, as from the gradually increasing pressure of the large flat masses of inflammatory exudation met with in Pott's disease, than where it comes on rapidly, since in the latter case the nerve-elements and bloodvessels do not have the same opportunity to accommodate themselves to the lessening space. In cases of the former sort, a delay of a few weeks, or even days, in operating may be of far more consequence than that of an equal number of months under other circumstances.

Schlesinger points out, and his opinion is corroborated by that of others, that the cause of the paralysis is complex, and that it includes the effects of pressure, anæmia, necrosis, œdema, and also of inflammation. The latter element is of special importance, because, in the opinion of Horsley[1] and others, it is liable to increase after operation, though, on the other hand, Allingham offers evidence that it may occasionally diminish. Indications that the cord is not only compressed but softened are, however, in Bruns' opinion, not a positive contraindication to operation.

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[1] Arch. für. Chirurgie, 1895.

[2] Citation by Bruns.

To what extent is it worth while to operate where there is little prospect of inducing a cure? This is a question which each physician and surgeon must answer for himself, and with reference to the individual circumstances of each case. I do not, myself, believe that the surgeon should throw the decision too much upon the patient. The alternatives which he is bound to offer (let him express them as simply as he may) are bound to be bewildering, and the choice which the patient makes is far less likely to be a good one than that which the conscientious physician can make for him.

Bruns believes that when the diagnosis of tumor is fairly made it is usually best to operate, but that this diagnosis can rarely be conclusive until signs of actual cord pressure have appeared, and even then the outcome is largely a lottery.

The second and third cases reported by us give some ground for greater hopefulness in prognosis than an interpretation of reported facts in the light of our narrow knowledge might seem to justify. Sometimes the operation appears, in accordance with some subtle principle, to induce to a new "set" to the tendencies at work. The tumor may perhaps be led to grow in a new direction; or, as in the second case reported by us, the temporary relief to pain may introduce a fairly persistent relief. The history of neuralgias of other sorts gives abundant illustrations of this sequence. Thus the biographer of Lord Lawrence tells how, while he was Governor of the Northwestern Provinces of India, and had been for a long time a sufferer from facial neuralgia—usually so intractable—the news was brought of the outbreak of the great mutiny, which compelled him to work day and night in despatching troops. Under this powerful stimulus, and in spite of fatigue, the neuralgia disappeared, never, it is said, to return.

Cases of intramedullary tumor, as one might suppose, have never been operated on successfully. The nearest approach to this was in the case of Church and Eisendrath, where a well-defined spindle-celled sarcoma was removed from the posterior half of the cord. Unfortunately the wound became septic; had it not been so, the writers think the patient might have done well. Horsley[2] and Crofts (cited by Horsley) have tapped, the one the cavity in a case of syringomyelia (case of Gowers), the other a "cyst"; but with only temporary improvement. I have done a "lumbar puncture" in a case of syringomyelia, hoping that the altered circulatory conditions might bring relief to the persistent pain, but without effect.

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[1] British Medical Journal, 1890.

[2] Ibid.

Finally, I would say, in spite of not wishing to enter on the large subject of the localizing diagnosis of tumors, that physicians and surgeons who have such cases in charge can do good service by making very careful observation as to the exact areas in which the sensibility is altered, and the character of this alteration. It will be generally found that, in spite of many routine statements to the contrary, it is not the line of the ribs, but lines more or less at right angles to the long axis of the body, that are followed by the upper margin of the affected surface, and that the back and the sacral areas tend to escape unless the lumbar portion is involved, and occasionally—contrary to the usual statement—with tumors compressing the cauda equina. [Lacquer.] It may also be noted that pain occurs sometimes when no cause can be assigned, and fails, as in our third case, where it would pre-eminently be expected. (This latter will, I think, be oftenest noted with tumors of the cervical segments.)

It is an interesting fact, that in the diagnosis of spinal tumors as regards localization, and in framing an explanation of the symptoms, we have now begun to draw on more subtle principles than those of anatomy. Prominent among the newer studies in this direction are those of Head (*Brain*, 1895), whose researches were primarily undertaken for the investigation of the relation between disorders of the viscera and the hyperæsthesia of definite areas of the skin. Head finds that his skin-areas correspond neither to the distribution of peripheral nerves nor of the spinal nerve-roots, and believes that they represent spinal segments of the gray matter. The boundaries of his areas do not run parallel with the ribs, but are at right angles with the long axis of the body, thus corresponding with a type of arrangement which has been repeatedly noted in descriptions of sensory disorders resulting from spinal tumors. He also calls attention to the fact that the increased sensitiveness of the skin, associated with visceral irritation, is not a real increase of the contact sense, but is to be classed as a painful affection—*i. e.*, as a hyperalgesia and not a true hyperæsthesia. This is also true of the area of sensitiveness which lies just above that of anæsthesia in tumor cases.

It can hardly be doubted that some of the curious relationships between certain conditions of the visceral organs and the pain, in spinal tumor, are best explained by the aid of Head's observations. Thus in our first case one of the most serious causes of exacerbations of pain was the slight distention of the bowels with gas, and the conditions present immediately before and after a movement. One might possibly adopt the explanation suggested by Lacquer for the pain attendant on straining at stool—namely, the disturbance in the abdominal and secondarily the spinal circulation, but it is at least an equally reasonable hypothesis that the effect was due to the slight but additional irritation of the affected segments of the spinal cord. Even though the pain was not strictly confined to the cutaneous areas most closely related to some particular viscus, but represented only an increase of the habitual pain due to the tumor, the same explanation would hold good, for Head's observations show that these sensory reflexes follow a law similar to that which governs motor reflexes, in that two factors are at work. As soon as any stimulus reaches the gray matter of the spinal cord it instantly diffuses itself, and although the effect most likely to follow will tend to confine itself to the level at which the nerve conveying the stimulus first terminates, yet if a peculiarly irritable condition of the gray matter exists at another level the response may come from that, and the next time the same result may occur more readily through the action of the law of association and habit. It is in the same way, I think, that the effect of gaping and sneezing, and even, as in our case, slight movements of the head and face, come to exert such a strong influence in exciting pain. It is doubtless true that these movements produce slight changes of tension within the spinal canal, but these must be so slight that they would fail to be effective for harm had they not been at the same time associated with stronger movements which were capable of drawing, to a material degree, on the inflamed parts.

The consideration of our first case calls to mind another point of both theoretical and practical interest. It was, namely, very noticeable that the areas supplied by the lower sacral nerves—that is, the well-known saddle-back area—retained its sensibility to a far greater degree than that supplied by the lumbar portion of the cord, although that was wholly below the point of pressure. This condition of affairs is found repeated in many of the observations, and Eskridge calls attention to this as perhaps characteristic of tumor cases. One may offer theoretical explanations based on mechanical principles, but the fact is worthy of being placed side by side with the observations (not invariably correct) [Lacquer], that when the cauda equina, as a whole, is injured, it is pre-eminently these same lower sacral nerves, though they occupy a protected position in the middle of the aggregate bundle, which are most affected; and also with the fact pointed out by Bruns, that the root symptoms provoked by intradural but extra-medullary tumors are usually referable not to pressure upon the nerve-roots in their course but to pressure exerted at their point of exit from the cord.

With regard to the favorable results which followed operation in the second and third cases reported by us, it would be hazardous to assert that they are so clearly attributable to the operation as to justify repetition of the procedure in similar cases. This is not the first time that the spinal canal has been opened in cases of intramedullary tumors, though sometimes the condition actually found was a surprise. This happened in the case reported with such care by Bruns, and there also a considerable degree of improvement as regards pain did, as a matter of fact, follow the operation.

The consideration of the lesions met with in these compression cases, as shown by the history of Pott's disease, myelitis, and of the tumor cases reported by Bruns, Schlesinger and others, suggests reasons enough why the improvement in some of these cases is so much greater than it is in others. For some reason not clearly definable the effects of compression sometimes lead to hemorrhages and necrotic softening, both at the point of the greatest narrowing and occasionally a little higher than this as well, while at other times such lesions are wholly absent, although the stricture may reach a high degree.

A FIFTH CASE OF "FUNGOUS FOOT" IN AMERICA.

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AND
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ARMY MEDICAL MUSEUM, WASHINGTON, D. C.

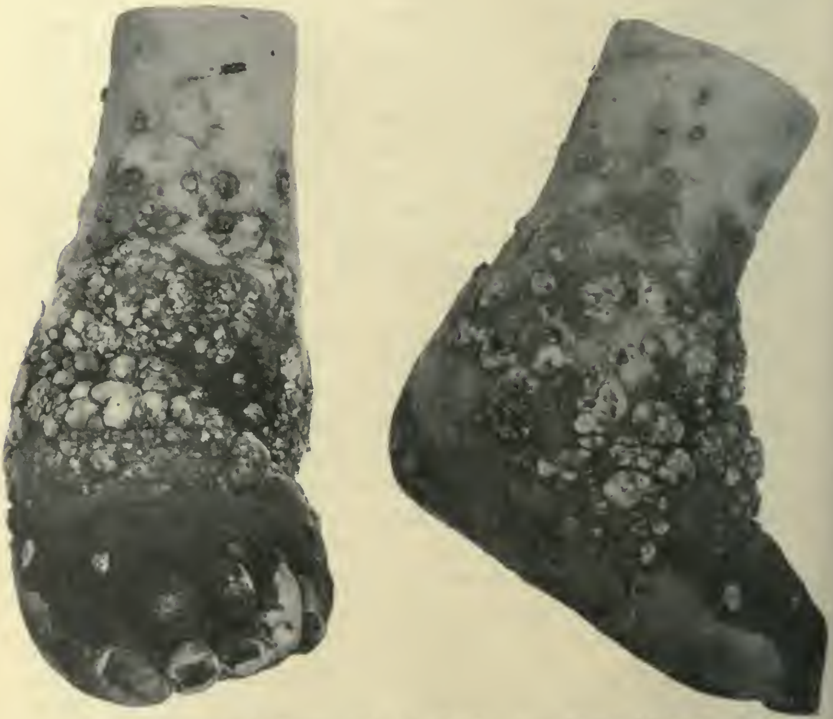
The history by Dr. Arwine is brief, but the best that could be obtained.

Pedro B.; was born in Southwestern Texas; of Mexican parentage; aged forty-five years; married; six children. Family history good; no history of syphilis. He lived on a ranch thirty or forty miles from Fort Ringgold; had never lived elsewhere. The disease began about the year 1887 with severe pain in the left foot, lasting thirty-six hours. After this a red spot appeared on the foot. The man had chills and fever; no cause for the condition was known. Throughout almost the whole course of the disease the pain continued; it was most severe at night, and was worse in summer than in winter; toward the last it subsided. The only treatment was the use of a few simple household remedies. The local physicians diagnosticated elephantiasis, and advised amputation.

He came to Dr. Arwine on March 5 (or 6), 1889, complaining of the leg being too heavy to carry; there was then no pain. On the 16th Dr. Arwine amputated; there was but little shock; about eight arteries in addition to the tibials, all of which were much enlarged, were tied. Recovery was complete and without event; the more gratifying because the man's surroundings at the time of the operation were quite unsanitary.

The amputated part was sent to the Army Medical Museum, but was not in good preservation when received. It is numbered 11,699 in the pathological series, and consists of the left foot and lower half of the leg. The foot and ankle are much enlarged, and show the characteristic *buttons* of fungous foot (mycetoma, Madura foot, fungous foot of India); the buttons vary in size, and are most numerous and closely set on the dorsum of the foot (Fig. 1). The subcutaneous tissue shows numerous sinuses and fistulæ filled with oily and white, pasty matter, mixed with innumerable rounded, brownish bodies measuring 0.5 to 2 mm. in diameter. The bodies were sometimes in masses, the diameter of a centimetre, and were most numerous near to and beside the bones. All the bones were honeycombed with cavities and fistulæ, in which were similar masses; the bones of the foot were so friable that they could scarcely be handled. The tibia and fibula (Fig. 2) showed hyperostosis, especially in the upper part of the amputated portion; and as this was the part most recently affected by the disease, it seems probable that, so far as the bone is concerned, hyperostosis is the first effect of the irritation of the fungus. In some places, particularly around the ankle, was a dense mass of connective tissue (in one place nearly an inch thick), the result of the inflammatory process. The bones are mounted as 11,725.

FIG 1.

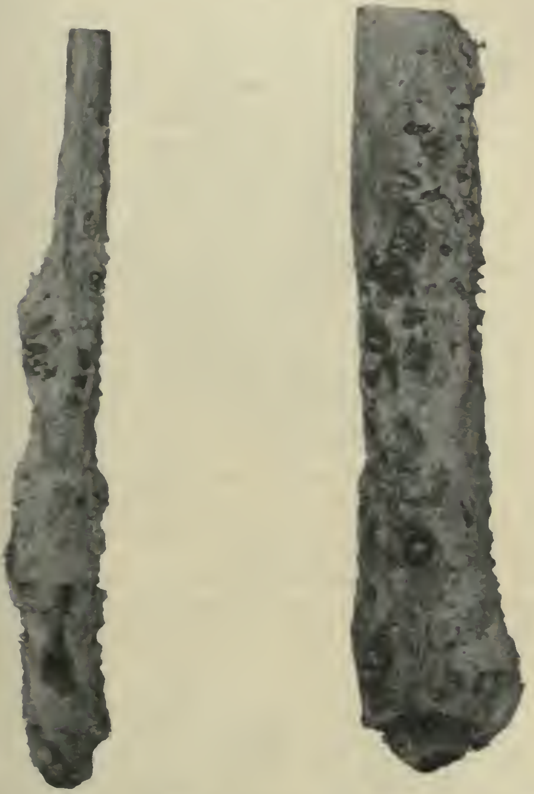


From photographs taken by Dr. W. M. Gray, Army Medical Museum.

Dr. James Carroll, of the Army Bacteriological Laboratory, makes the following statement in regard to the microscopical characters of the tissues and fungi:

The specimen gave off a very disagreeable odor, showing that it was not in a good state of preservation. A portion of the skin and underlying tissue was removed from the posterior surface of the leg for embedding.

FIG. 2.



Outer side of tibia and inner side of fibula; shows hyperostosis, osteitis, and fungous masses in the cavities. (From a photograph taken by Dr. Gray.)

Small hempseed-like bodies were found in considerable numbers free in the connective-tissue spaces and sinuses. They were of a yellowish-brown color, some darker and some lighter, generally rounded or lobulated in outline, and their surfaces slightly roughened. In size they varied from about 1 to 3 millimetres.

These seed-like bodies were easily crushed upon a slide, and appeared to consist of a dense, brittle, cortical layer, enclosing a central grayish, pulpy mass of pultaceous consistency. All attempts to identify the structural elements of these bodies resulted in failure. They were macerated in water, caustic potash solution, etc., and were crushed and examined in the fluids, or were dried upon the slide and stained by various methods, but no positive evidences of a mycelium or other definite structure could be determined. The central pulpy material appeared to have undergone complete disintegration, and in consistency was almost caseous. The cortical layer broke up into vitreous, yellowish, brownish, or colorless granular masses which showed no distinct striation or other definite arrangement.

Among the stains tried were thionin and Weigert's modification of Gram's method. With tissue sections complete failure was the result in all attempts to stain the cell nuclei. Nothing better could be obtained than a diffusely colored structure, the minute details of which could only be recognized by differences in the form and arrangement of its components. Large numbers of mastzellen were found uniformly scattered throughout the subcutaneous connective tissue. These were not more numerous in the vicinity of the fungous masses than elsewhere, and they were easily recognized under the immersion lens by their form, their very numerous hæmatoxylin-tinged granules of uniform size, and by their nuclei, which could often be seen as clear, unstained bodies, somewhat like the nucleus of a malarial parasite.

A conspicuous feature of the section was the presence in many of the lymph-spaces adjacent to the fungi of abundant amorphous granular material of a yellowish-brown color, which was very refractive. This was probably hæmosiderin. In other lymph-spaces, and, indeed, in some of those containing the above-described pigment, there were aggregations of finely and coarsely granular material, which stained a little more darkly with hæmatoxylin than any other element in the tissue.

I was unable to satisfy myself as to whether these were small portions of the fungus or cell detritus. As between the two I would incline rather to the former than the latter explanation, for the reason that in the immediate vicinity of the fungi, where numerous pus-cells were present, no such picture was obtained.

Other than these the section showed no traces of the minuter elements of the fungus apart from the small, club-shaped peripheral rays attached to the hempseed bodies now to be described.

The section was made to pass vertically through one of the elevations upon the skin, which, apparently, marked the outlet of a discharging sinus. Within the sinus, which in the stained section was 3 to 5 mm. in diameter, six small, seed-like bodies could be counted upon the slide with the naked eye.

Several of these projected above the level of the skin into the pouch-like sac upon the surface. The walls of the sinus were formed of distinct lines of connective tissue. Just within the wall and around and between the fungous bodies large numbers of pus-cells could be seen with the microscope. These were easily recognized, because in places a number of them showed characteristic nuclei in the sections stained with hæmatoxylin and eosin.

Under the low-power the hempseed bodies were found to be made up of aggregations of smaller masses, some of which were rounded, others fan-shaped, reniform, or lobulated. One or two showed a fernleaf-like branching arrangement. Many of these smaller units exhibited a distinct radial striation, which could be followed from the periphery to the centre, or, in the fan-shaped bodies, to the base or pedicle. The majority showed at the periphery a marginal zone of very small, club-shaped rays, which were remarkably symmetrical in form and arrangement. The central radial striations of the larger bodies were seen to be continuous with the lines of contact of these delicate rays about the periphery. In many of them a rather indistinct concentric striation could also be distinguished.

FIG. 3.

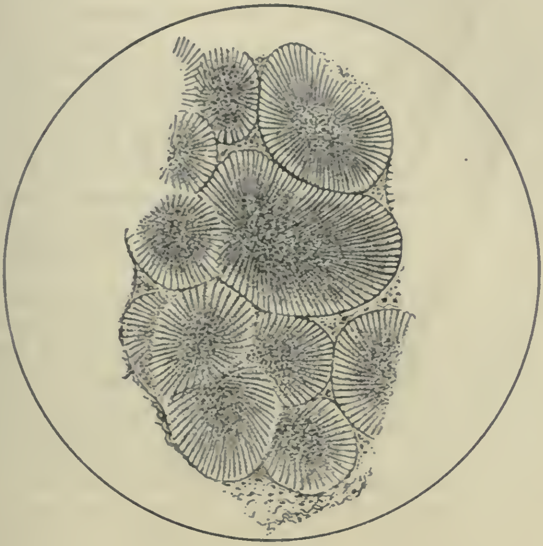
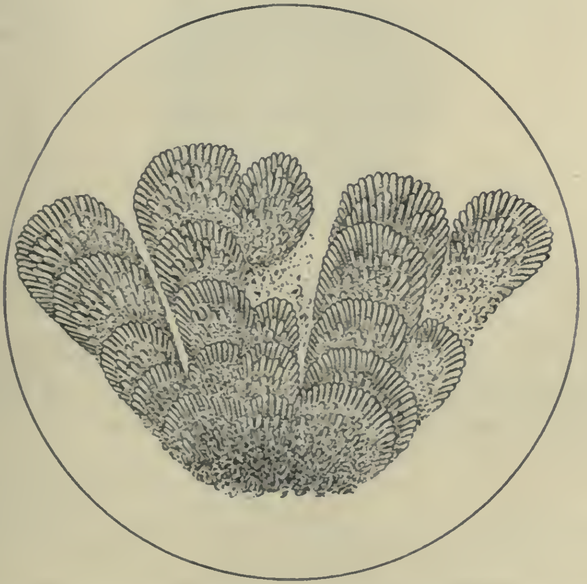


FIG. 4.



The above description applies to the section stained with hæmatoxylin and eosin. Gram's method proved of no service with these specimens.

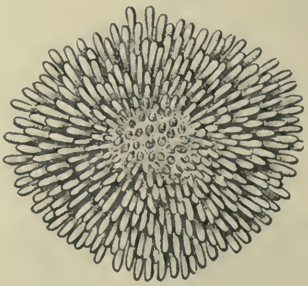
Saffranin yielded a very good picture of the gross masses with their peripheral rays and general striation. With thionin exquisite preparations were obtained, which began to fade, however, in a few days.

The accompanying pen-and-ink drawings were made from thionin and saffranin stained sections by Dr. J. C. McConnell, of the Army Medical Musuem.

Fig. 3 (saffranin) shows the arrangement of the smaller units into the larger masses, the whole picture probably representing one of the isolated hempseed bodies. In the section from which the drawing was made the centres of the bodies were somewhat denser than shown in the drawing; they presented more of a homogeneous, finely granular appearance, with a less distinct striation, except as to the periphery, where it is plainly marked. Apart from the lines where the druses are in contact with neighboring contiguous ones, the margins should be undulating, as they appear in Fig. 4.

Fig. 4 (thionin) shows in a beautiful manner the larger half of a hemispherical mass, consisting of imbricated processes arising as branches from a central stalk or base. The minute club-shaped elements were almost as distinct in the specimen as they appear in the drawing, and the interspaces between the processes were occupied by emigrated polymorphonuclear leucocytes, by which also the fungous mass was to a large extent surrounded. This body was situated in the sac-like expansion formed at the opening of the sinus upon the skin.

FIG. 5.



In Fig. 5 is shown a small body that was completely isolated. In my opinion it should be interpreted as a cross-section through the extremity of a process similar to those shown in Fig. 4.

After a study of these sections I have no hesitancy in pronouncing the fungus a variety of actinomyces. It is much to be regretted that the imperfect preservation of the tissue precluded any histological investigation of the lesions resulting from its presence.

JAMES CARROLL,
Acting Assistant Surgeon U. S. Army.

The photographs of the leg and foot and bones of the leg were made by Dr. W. M. Gray, of the Army Medical Museum. One shows well the characteristic *buttons;* the other, the fungous masses on and in the bone.

The cases thus far reported from America are as follows: Adami and

Kirkpatrick (*Transactions of the Association of American Physicians*, 1895, vol. x. p. 92): Male, aged twenty-one years; Canada; ten years' chronicity, right side of the body. Hyde and Senn (*Journal of Cutaneous and Genito-urinary Diseases*, New York, 1896, vol. xiv. p. 1): Male, aged twenty years; United States; thirteen years' chronicity, left side of the body. Pope and Lamb (*New York Medical Journal*, 1896, vol. lxiv. p. 386): Male, aged twenty-seven years; Texas; eight years' chronicity, right side of the body. Wright (*Transactions of the Association of American Physicians*, 1898, vol. xiii. p. 471): Female, aged twenty-six years; Italy and United States; six months' chronicity, left side of the body. Arwine and Lamb: Male; aged forty-five years; Texas; twelve years' chronicity, left side of the body.

It is probable, as suggested by Prof. Adami, of Montreal, that a careful examination of museums would disclose additional specimens; it is probable, also, that many cases of this disease have been erroneously diagnosticated as elephantiasis. Inasmuch as the two American cases in possession of the Army Medical Museum came from Texas, it would seem likely that that section of country would be an inviting field for research. Since, also, in India at least, the disease is found almost exclusively among the peasantry who go barefoot on the soft-ploughed ground, tropical and semi-tropical America ought, theoretically, to furnish many more cases than the few which have been reported.

The subject has been written up so fully by previous reporters that it seems unnecessary to do more than refer to their papers.

SOME FACTS IN REGARD TO ANEURISM OF THE AORTA.

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THE occurrence of a number of cases of aortic aneurism in the practice of one of us (Hare) has led us to the study of the literature of this subject, with the object of determining certain statistical points in connection with this very interesting pathological condition, and we have analyzed the histories of 953 cases, taken at random from the reports of the clinicians in this country and abroad.[1]

We have not attempted to make a study of the relative frequency of aneurism in the thoracic aorta as compared to aneurism of vessels in other portions of the body, but our endeavor has been to obtain information concerning the most common location for the development of the growth, its usual cause, the direction of its development, the frequency of the disease in the two sexes, the symptoms most commonly produced by aneurismal growths in different situations in which they occur, and the most common cause of death. In connection with these important topics we have also collected information in regard to other matters of almost equal interest.

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[1] These statistics are taken from London Hospital Reports, the Transactions of the Pathological Society of London, the New York Pathological Society, the Philadelphia Pathological Society, and files of current periodicals, and not from any series of cases previously collected.

In order that our study may be as clear as possible, we have divided the aorta, as it is commonly divided, into the ascending, transverse, and descending portions of the arch, making a fourth division of that portion of the aorta which extends from the descending portion of the arch to its point of exit from the thorax through the diaphragm.

It is a well-known fact, that syphilis and alcohol, or perhaps hereditary weakness of the arterial walls, are particularly prone to result in aortic aneurism in persons who are subjected to violent vascular strains, or whose vessels present beginning degenerative changes due to advancing years, it being remembered that the old saying "A man is as old as his arteries" holds true in this connection, for syphilis and alcohol may produce changes in the bloodvessels at comparatively early periods of life, which correspond somewhat to those which are seen many years later in perfectly healthy individuals.

It is also a well-recognized fact in the literature of aneurism that the majority of these growths are saccular rather than fusiform.

We have collected from medical literature 570 cases of aneurism of the *ascending portion of the arch.* Of these, 544 were sacculated and 466 occurred in males and 78 in females. The remaining 26 cases were fusiform, and all of these 26 aneurisms occurred in males. These statistics seem to us of interest as confirming the general opinion in regard to this lesion, and emphasize very forcibly the far greater frequency of sacculated aneurism than the fusiform variety. When we consider that of nearly 1000 cases analyzed, aneurism of the ascending arch occurred no less than 570 times, while aneurism of the transverse arch occurred only 104 times, and of the descending portion 110 times, the great difference in frequency is marked.

Of the 466 cases of sacculated aneurism occurring in males, it is interesting to note that the great majority of them occurred in persons between thirty-five and forty-five years of age; that the next greatest frequency was in persons between twenty-five and thirty-five, then between forty-five and fifty-five, and so on down, as is shown in the accompanying table:

	15 to 25	25 to 35	35 to 45	45 to 55	55 to 70	Total.
Males	26	100	170	86	21	401
Females . . .	2	14	30	16	10	72
Unknown . . .	...	...	...	...	...	69

The statistics in regard to fusiform aneurism affecting the ascending portion of the arch are not sufficiently clear to enable us to reach such positive conclusions, thus:

No cases were found between the ages of 15 and 25
8 " " " " " " " 25 " 35
7 " " " " " " " 35 " 45
4 " " " " " " " 45 " 55
3 " " " " " " " 55 " 70

The sex was stated in 22 cases; in the remaining 4 of the 26 no statement as to sex was made. No case is stated to have occurred in a female.

Passing on to the consideration of the most common cause of aneurism of this portion of the arch, we find among the males that no less than 30 patients were considered to be perfectly healthy as far as any causative disease was concerned; that 28 had a history of syphilis; that 45 suffered from alcoholism, and 3 of these 45 had as an additional history of exposure to trauma; 17 are said to have been due to rheumatism; 4 to syphilis and alcohol combined; 47 to trauma, and in the remaining 295 no statement as to the probable cause of the disease was made.

It is interesting in this connection to note that alcohol was considered the cause in such a large majority of the cases, almost equalling trauma in frequency, and it seems to us also of interest that syphilis is reported as the cause in but 28 cases—in other words, falling far below alcoholism in importance as a cause-factor.

Among the females we find that but 3 were considered healthy; that 4 had syphilis, although 1 of these 4 gave a doubtful syphilitic history; 6 suffered from alcoholism, 1 of these being also doubtfully syphilitic; 5 had rheumatism; in none were syphilis and alcoholism associated; 25 were ascribed to trauma, and in 35 the cause was unstated. The number of cases recorded in females is, once again, too small to enable us to reach positive conclusions; but it is interesting to note that in this sex also trauma far exceeds all other causes in the production of the disease, and that alcoholism and syphilis, while far below trauma in importance in producing the lesion, are the next most frequent causes.

Another interesting fact worthy of attention is that syphilis and alcoholism are ascribed as the cause in a very small percentage of cases in females as compared to males.

In the fusiform variety it is stated that 6 of the males were healthy; in none of them was syphilis considered the cause of the disease; in 2 alcoholism was given as the cause; trauma was the cause in 4, syphilis and alcohol in 1, and in 13 no statement as to the cause was made.

Death occurs as a result of aneurism of the aorta either from rupture of the aneurismal sac, from the pressure of the sac upon important nerves and bloodvessels, or from the secondary changes which take place in these tissues and in other vital organs as a direct or indirect result of such pressure. Among the causes of death other than rupture in the sacculated variety of aneurism of the ascending portion of the arch, it is interesting to note that dyspnœa is described as the most common cause, death being due to this condition, according to the reports, in 17 cases. The next most common cause is stated to be exhaustion, which produced death in 15 cases; serous pleural effusion resulted in death in 12; serous pericardial effusion in 7; suffocation is stated to have been the cause of 7, while only 2 are thought to have been due to congestion of the lungs, 2 to pneumonia from pressure, 2 from bronchitis, 2 from exhaustion due to leakage from the aneurism; 2 are credited to apoplexy of the lung, 2 to pleurisy, 1 to pleural pneumonia, 1 to suffocation from pressure on the trachea.

Among the females 9 are said to have died of exhaustion, 1 from abscess of the lung, 3 from dyspnœa, although in all probability 1 of these cases was due to rupture, since the external tumor suddenly disappeared just before death, but no autopsy was permitted to determine that it had ruptured.

Among the fusiform aneurisms 3 of the males are stated to have died of exhaustion, and 5 from excessive dyspnœa, the balance, of course, being from rupture.

When we come to the consideration of the direction in which sacculated aneurisms of the ascending arch most commonly rupture, or, in other words, when we study the neighboring tissues into which the blood forces its way when the wall of the aneurism bursts, we find that the vast majority rupture into the pericardium. Thus out of 289 cases in which death was stated to have been due to rupture in males, 75 ruptured into the pericardium and 58 into the pulmonary artery; 23 ruptured into the right auricle, 3 of these taking place some time before death; 23 ruptured externally; 14 ruptured into the superior vena cava; 11 into the œsophagus; 9 into the left auricle; 8 into the right ventricle; 8 into the trachea; 6 into the left ventricle; 6 into the left pleura, and 5 into the right lung; 3 burst in the posterior mediastinum, and 1 burst simultaneously into the trachea and œsophagus; in 20 others no statement was made as to the direction of the rupture.

There are a number of interesting facts in connection with the points which we have named. Among these it is stated that 35 of the 71 cases which ruptured into the pericardium were aneurisms of the dissecting variety, and that one of them had an ulcer on an aortic leaflet; but still more interesting is the fact that 1 of the 58 cases which ruptured into the pulmonary artery lived for four months after the rupture took place; another lived for two months, that another lived three hours, and that two lived "several" hours, showing that the false circulation was established without sufficient disorder to the general circulation to produce death, and that the inflammatory adhesion of the aneurismal sac to the pulmonary artery was sufficiently strong to retain the blood in the circulatory system. Of the 23 cases which ruptured into the right auricle we also find that the rupture occurred in 3 of these some time before death took place, and that in 3 of the cases which ruptured into the right ventricle death was gradual. In 1 of the cases which ruptured into the left auricle the statement is made that death resulted not from the hemorrhage directly but from anæmia of the vital centres, due to the diverted blood-stream.

In the cases which ruptured into the superior vena cava death occurred in 2 instances slowly, and in 3 of those which ruptured externally the oozing was gradual before death occurrred.

Among the females suffering from sacculated aneurism of the ascending arch we find again that the most frequent direction of rupture was into the pericardium. Thus out of 37 cases 24 ruptured into this sac; 5 ruptured externally; 3 burst into the pulmonary artery; 2 into the right ventricle; 1 into the pleura; 1 into the lungs, and still another into a tubercular cavity of the lung; 15 of the 24 cases which ruptured into the pericardium are described as dissecting aneurisms.

In regard to the condition of the aorta in these various cases of rupture in the two sexes, we find the following information: the blood-vessel wall, aside from the aneurismal sac itself, is described in males as being healthy in 11 instances, as atheromatous in 77 instances, and no statement is made as to the condition of this vessel in 378.

Among the females the aorta is described as healthy in 3, atheromatous in 13, and no statement is made in regard to 62 of them.

Of the fusiform aneurisms, we find that but 2 ruptured into the pericardium, 4 into the trachea, 3 into the pulmonary artery, 2 into the œsophagus, and in 2 others no statement is made as to the direction of the rupture. In these cases the aorta is described as healthy in 8, atheromatous in 8, and no statement is made in regard to 18 of them.

As secondary changes in the heart itself very frequently result in cases of aneurism, we have examined into this question with some interest. Among the males we find that the heart is described as healthy in 58 instances and as hypertrophied in 29. In 16 cases the left ventricle is described as hypertrophied, and the aortic valves thickened and incompetent. In 8 other cases the aortic valves are described as thickened, in 10 as incompetent, and in 4 as thickened and incompetent, without there being associated ventricular hypertrophy. In these 4 cases the mitral valves were described as atheromatous; 1 case is stated to have had a dilated left ventricle, with deposits on the aortic valves, 1 had mitral stenosis, 1 suffered from a small left ventricle, but had a very large right ventricle. In 1 hypertrophy and dilatation of the heart were present, and the aortic valves were destroyed by pressure, and in 1 other cauliflower growths were found on the aortic valves, and these are supposed to have caused the ulceration, and hence the aneurism. In the remaining 313 cases the condition of the heart and valves was not given.

Among the females the aortic valves were reported as being thickened in 6, incompetent in 3, and diseased in 2. The heart is stated to have been healthy in 5. Hydropericardium was present in 1 case, pericardial adhesions in 1 other, and hypertrophy of the heart in 2 other cases. In 58 no statement was made.

In the fusiform aneurisms of this portion of the arch the heart is described as being healthy in 2, dilated in 4, and hypertrophied in 3. Pericardial adhesions were found in 2 instances, and the aortic valves were thickened and atheromatous in 6 instances.

In regard to the pressure-symptoms produced by aneurisms of the ascending portion of the arch, we find that out of 80 cases in which the statement is made in regard to pressure-symptoms, 27 suffered from lividity and œdema of the face, 24 from dyspnœa and pain, 10 from œdema and pain in the neck and arms, 8 from aphonia, 6 from orthopnœa, 3 from vomiting, and 2 from pulmonary œdema.

Among the females lividity and œdema of the face were present in 4 instances, pain and cough in 3, and dyspnœa and cough in 4. Among 12 cases of fusiform aneurism, in which information in regard to pressure-symptoms is given, we find that 5 suffered from general œdema, 2 from general œdema and orthopnœa, 2 from dyspnœa, 2 from pain and aphonia, 2 others from dyspnœa and aphonia, and 1 from dyspnœa, œdema, vomiting, and syncope.

In regard to special symptoms produced by pressure, the following interesting facts were developed concerning inequality of the pulse and pupils:

Among the sacculated aneurisms we find 8 in which it is stated that the right pulse was greater than the left; the left pulse was greater than the right in 4 instances, and in 1 case the left pulse was absent in the axillary, brachial, radial, and carotid arteries. The left pupil was larger than the right in 4 cases, but in 419 cases no statement as to the condition of the pulse and pupils was made either in the male or female sexes.

Information in regard to these points in connection with fusiform aneurism was not obtainable.

Closely connected with this question of pressure-symptoms is the statements which are made in regard to the direction in which the aneurisms develop. In 21 it is stated to have projected downward, in 5 upward, in 17 forward, and in 13 backward; backward and to the left in 3, backward and to the right in 5, to the left alone in 4, and it is a noteworty fact that it extended to the right in no less than 60. This direction is that which we would expect from the impact of blood against the aortic wall.

The pressure-symptoms which we have described so far are those which were noted during life. The result of autopsy showed that the growth had pressed upon neighboring organs as follows: In 29 instances the trachea was compressed; in 21 the left lung was disintegrated from pressure on the left bronchus, and in 1 of these the left vagus was "greatly strained." In 17 the aneurism compressed the superior vena cava; in 14 it compressed the pulmonary artery; in 6 the right lung; in 8 it eroded the vertebræ, and in 6 it eroded the ribs and part of the sternum; in 2 others erosion of the clavicle, sternum, and ribs occurred; in 2 the left vagus is stated to have been compressed, but the recurrent laryngeal nerve escaped. In 2 cases the left bronchus was ulcerated and the vertebræ eroded; in 3 the diaphragm was pushed upward, and 1 of these also eroded the vertebræ; in 2 others the right auricle was compressed, and in 1 the innominate artery.

In 6 the lungs were consolidated by pressure.

Among the fusiform aneurisms it was found post-mortem that 3 compressed the superior vena cava; 1 produced pulmonary apoplexy; another pulmonary congestion; the third compressed the trachea and laryngeal nerve, and 2 compressed the trachea alone.

It is much to be regretted that the reporters of these cases of aneurisms have not given us further information in regard to the pressure-symptoms during life, and of the conditions produced by pressure which are found at autopsy. If we did not know that pressure-symptoms were so commonly met with in aneurisms we might be led to suppose from these statistics that they are rare complications of the lesion.

A study of the occupations of these cases of aneurism which we have just described fails to reveal that any particular one can be considered as distinctly provocative of the condition, save that the disease occurred most frequently in soldiers, in whom it is said to have occurred in 11 instances, in sailors in 9 instances, in porters in 10 instances, in laborers in 6 instances, and in coachmen in 5 instances. Almost every other occupation known provides from one to three cases.

It seems to us that this is rather an interesting fact, as we would have supposed that certain occupations would far exceed all others in the frequency with which they aid in producing this condition of the ascending portion of the arch.

THE SECOND OR TRANSVERSE PORTION OF THE ARCH. When we come to the consideration of aneurisms involving the second or transverse portion of the arch of the aorta we find once again that the most common age for the development of this lesion is between thirty-five and forty-five, for out of 88 males suffering from this lesion 37 were between these ages, 21 between forty-five and fifty five, 14 between twenty-five and thirty-five, 10 between fifty-five and seventy, and 2 between fifteen and twenty-five.

In 66 of the cases no statement was made as to whether the patient was healthy or not; 8 of them were stated to be healthy; 7 cases were stated to be due to trauma, 5 to syphilis, 2 to alcoholism, and none were attributed to rheumatism; 16 cases occurred in females, and here again the greater number were between thirty-five and forty-five, namely 8; 4 between forty-five and fifty-five, 2 between fifty-five and seventy, 1 between twenty-five and thirty-five, and 1 between fifteen and twenty-five.

Of the causative factors producing the lesion, 1 is attributed to syphilis and 2 to alcohol; in the remainder no cause was given.

When we come to consider the cause of death other than rupture we find in 88 males that 1 died of pericarditis, 2 of suffocation, 1 from collapse, 8 from exhaustion, 1 from œdema of the larynx, and 1 from pneumonia.

Among the females 1 died of paroxysmal dyspnœa, 4 from exhaustion, and 1 from pressure on the trachea.

In 37 of the males a statement is made as to the surrounding organs into which the aneurism burst; 7 of these burst into the œsophagus, 7 into the left bronchus, 7 into the trachea, 4 into the left lung, 4 into the left pleura, 4 into the pulmonary artery, and 2 into the right pleura.

Among the females 2 burst into the trachea and 2 into the pericardium.

The directions of the aneurismal growth was in 21 cases backward and to the right, and in only 2 upward and to the left; in 2 others it was directly backward; in 15 it was directed upward and to the right, and in 2 others upward and backward. The condition of the aorta in males was described as being healthy in 5 instances, and as atheromatous in 38; in 45 cases no statement as to the condition of this vessel was found.

Among the females the texture of the vessel-wall is stated to have been healthy in 1 instance, atheromatous in 6, and in 9 others no statement was given.

In regard to the condition of the heart, we find among the males a comparatively small number of cases in which a careful description of this organ is given. In 62 out of 88 instances no statement is made. It is, however, a rather noteworthy fact, that out of the remaining cases the great majority are stated to be healthy; thus 16 of the cases were said to have a healthy heart and valve; in 2 the left ventricle was dilated and the right ventricle hypertrophied; in 3 others the aortic valves were incompetent, in one of these the valves were also thickened; in still another case the aortic valves were competent but thickened; in 2 others they were said to be atheromatous, and in another to be covered with fine granules.

Among the females it is stated that in 6 instances the heart and valves were healthy.

It is interesting to note whether the symptoms produced by pressure in aneurisms of the second portion of the arch are similar to those produced by pressure by aneurisms at the beginning of the arch.

An analysis of the cases involving this portion shows that inequality of the pulse and of the pupils is mentioned in very few instances. Among the males it is stated in 2 cases that the left pulse was absent; in 13 that it was weaker than the right; in 6 a definite statement is made that the pulses were equal, and in 67 no statement in regard to this point is vouchsafed.

No statement in regard to variations of pulse and pupil is made in the 16 females.

Of the other pressure-symptoms we find among the males that dysphagia was present in 4 cases, pain in only 1, hoarseness in 1, aphonia in 1, shrill voice in 1, and œdema of the arm and forearm in 1; in still another, attacks of syncope occurred in which the carotids ceased to beat.

Among the females 4 suffered from dysphagia, 1 from paroxysmal dyspnœa, and 1 from constant dyspnœa; in other words, in only 16 cases are ante-mortem signs of pressure recorded.

At the autopsy we find that the tracheal rings were eroded in 6 cases; the left innominate vein stretched in 4 cases, in 1 of which it was obliterated; in 4 others the superior vena cava was compressed; in 1 the inferior vena cava was compressed, and the pneumogastric and recurrent laryngeal nerve were also involved by the pressure. In 2 cases both the trachea and ribs were eroded; the left carotid and innominate arteries were compressed in 3 cases; the vertebræ were eroded in 3; the œsophagus compressed in 4; the ribs and the vertebræ both eroded in 4; the right lung compressed in 2, and the ribs and sternum eroded in 2 instances. In one the left vagus and left recurrent laryngeal nerve were compressed and the left brachial cephalic vein obliterated; in another empyema is said to have arisen from pressure, and in the third the phrenic nerve was destroyed for the space of 3 inches by the pressure of the aneurism; 2 cases flattened the left bronchus, in 3 collapse of the left lung, and a number of other single ones are recorded as having compressed the trachea and left bronchus; another as causing adherent pericardium, and the third as projecting into the second intercostal space.

Among the females 4 eroded the vertebræ, 3 compressed the œsophagus, 2 eroded the ribs, 1 pressed down the right lung and was adherent to the ribs, which it slightly eroded, and another compressed the left bronchus and trachea.

It will be seen, therefore, that aneurism of this portion of the arch produces pressure-conditions which are not very characteristic, since a very large number of parts are often pressed upon.

THE THIRD OR DESCENDING PORTION OF THE ARCH. We have collected 110 instances in which the third or descending portion of the arch was affected by the aneurism. Here, again, the frequency of the malady between the ages of thirty-five and forty-five years is striking in contrast with its frequency at other ages. Thus among 93 males so affected but 2 were between fifteen and twenty-five years, 20 between twenty-five and thirty-five years, 41 between thirty-five and forty-five years, 12 between forty-five and fifty-five years, and 11 between fifty-five and seventy years. Among the females a somewhat similar frequency also exists, although the small number of cases hardly justifies the comparison, there being but 17; of these 2 suffered from aneurism between fifteen and twenty-five, 4 between twenty-five and thirty-five, 5 between thirty-five and forty-five, and 4 between forty-five and fifty-five years.

In regard to the causes ascribed, we find among the males trauma is held responsible 15 times, alcohol 13 times, syphilis but twice, syphilis and alcohol once, and rheumatism once; in 6 instances the patient was said to be healthy. Among the females trauma is given as a cause in 5 and syphilis and alcohol in 2 cases.

In 64 of the cases occurring in males a statement as to the seat of rupture is given; in 19 instances the aneurism ruptured into the œsophagus and in 17 into the left pleura; 10 ruptured into the right pleura, 8 into the left bronchus, 3 are said to have burst into the lungs, 2 into the pulmonary artery, and 2 into the left lung. Among the females rupture took place six times into the œsophagus, twice into the left bronchus, and twice into the left pleura; once the aneurism ruptured into the vena cava superior. The frequency with which rupture took place into the œsophagus in these cases is of interest, and the rupture into the left portion of the chest is to be expected from the seat of the growth.

Among the causes of death which are given in connection with these cases of aneurism involving the third portion of the aortic arch we find that very little information is available, for in only 17 of the cases are any facts stated of this character; out of these 17, however, 9 died from pressure upon the trachea, 5 from exhaustion, 2 from pressure on the bronchus, 1 from pulmonary apoplexy, and the direction in which the aneurism extended is stated in but 24 cases; in 11 of these it extended backward, in 6 to the left, in 2 to the right, upward in 2, in 2 forward, and in 1 to the right and backward.

In regard to the condition of the heart and its valves, we find that statements concerning this organ are made in connection with only 20 cases. Among the males in 15 of these the heart was normal, and in 5 it was dilated, hypertrophied, and the valves diseased. In the 6 females about whom information is given as to the condition of the heart, this organ is said to be healthy in 4, to be suffering from mitral stenosis in 1, and to be hypertrophied and dilated in 1. In only 23 instances was the condition of the aorta noted among males; in 20 of these it was atheromatous, and in the remaining 3 it was stated to be healthy. In females, of 17 cases in 9 it was found atheromatous.

In regard to pressure-symptoms which were produced by this growth, we find that again much information cannot be obtained from statistics, owing to the imperfect reports. In only 2 was the right pupil contracted, in 1 the left pupil was dilated, in 2 the left pulse was absent, and in 2 it was weaker.

From the anatomical position of this lesion we would not expect that there would be much variation in the character of the pulse except indirectly by pressure—that is to say, the aneurismal sac would not be in such a position as to interfere with the flow of blood into the vessels which are given off from the upper portion of the arch.

In regard to other pressure-symptoms, pain, cough, and dyspnœa were most commonly present, although they are stated to have been so in only 10 instances; in 3 there was a stridulous voice, in 8 dysphagia, and in 2 complete aphonia. So far as pressure-changes found post-mortem are concerned, there was no great constancy. In 8 the ribs and vertebræ were eroded, in 2 the trachea was flattened by pressure; in 2 others the aneurismal sac had eroded the vertebræ and compressed the recurrent laryngeal nerve; but it is a noteworthy fact that these pressure-symptoms found post-mortem were not as frequent as in other lesions of the heart, probably because of its situation.

There still remain 169 cases of aneurism of the arch of the aorta which we have been unable to classify into the three divisions named, because the reporter did not state the exact portion of the arch which was involved; of these 169 cases 124 occurred in males, and once again it is a noteworthy fact that the age, from thirty-five to forty-five, was one which was most commonly affected; thus between fifteen and twenty-five years of age there were but 2 cases; between twenty-five and thirty-five, 16 cases; between thirty-five and forty-five, 46 cases; between forty-five and fifty-five, 40 cases, and between fifty-five and seventy, 14 cases; in 6 cases the age was unknown.

Among the females this proportion was not so closely adhered to; there were 45 such cases; 2 occurred between fifteen and twenty-five, 11 between twenty-five and thirty-five, 6 between thirty-five and forty-five, 17 between forty-five and fifty-five, and 9 between fifty-five and seventy years.

In regard to the cause, we find that alcohol and trauma seem still to be the most common cause in the minds of the physicians who reported the cases. Thus although in 93 out of the 124 no cause was given, in the remaining cases we find that 11 were due to alcohol, 11 to trauma, 1 to syphilis, and 2 to syphilis and alcohol, while 6 others are stated to have been healthy, and among the females 5 were said to be due to trauma, 2 to syphilis, and 1 to rheumatism.

In 61 cases among the males a record is made of the part involved by the rupture; in 12 instances it ruptured into the œsophagus, in 12 into the trachea, in 6 into the lungs, in 6 into the pericardium, in 5 into the right pleura, in 5 into the left bronchus, in 4 into the pulmonary artery, in 1 instance its rupture taking place two weeks before death, in 2 it ruptured externally, in 1 into the superior vena cava, in 2 into the right lung, in 1 into the subdiaphragmatic tissues, and in 1 into the anterior mediastinum.

Among the females we have information in regard to only 17 cases; 4 of these ruptured into the pericardium, 4 externally, 2 into the pleura, 2 into the lungs, 2 into the left bronchus, 1 into the anterior mediastinum, and in 2 it is stated that the area of rupture was unknown.

Among the causes of death other than rupture we find pressure on the trachea caused death in 17 instances, exhaustion in 4, serous effusion into the pleura in 2, and pressure on the superior vena cava in 1. The causes of death among the females are stated in but few instances, chiefly dependent upon exhaustion, "suffocation," and pressure upon the trachea.

In concluding this paper, we may be permitted to call attention to several facts which we think are noteworthy: The first is the far greater frequency of this lesion in males than in females; second, the far greater frequency in involvement of the ascending portion of the arch than of the other portions; third, the fact that aneurism of the transverse and descending portion of the arch seems to be about equally frequent; fourth, that in a large proportion of cases death did not ensue from rupture but from pressure by the growth; fifth, that syphilis does not seem to play as large a part as an etiological factor as is usually supposed, although this evidence is negative rather than positive, since it is possible that many of the cases which were assigned to trauma as the cause are really dependent upon syphilis, in that this disease had primarily weakened the aortic wall so that injury readily brought about aneurism.

REPORT OF A CASE OF HODGKIN'S DISEASE, SHOWING LONG PERIODS OF FEVER.

By Cunningham Wilson, M.D.,
BIRMINGHAM, ALA.

PATHOLOGICAL REPORT,

By Simon Flexner, M.D.,
PROFESSOR OF PATHOLOGICAL ANATOMY, JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD.

Fever in Hodgkin's disease is one of the most common symptoms, but it is, however, rare for patients to present the long periods of fever shown in the report below. The temperature in this case ran for some time a course which resembled closely the chart of a typhoid patient, and only at times was there an intermittent or malarial-like temperature.

The charts presented by most writers show fever running from ten to fourteen days.

J. E., aged thirty-eight years, single, white, born in Alabama. *Family History.* Father living and well; mother living, but health poor; one sister living; one brother died of typhoid fever. *Personal History.* Had always had good health until his present illness. In 1892 he noticed enlargement of the cervical glands on the left side; this was soon followed by fever and loss of strength and flesh. The glands enlarged rapidly, causing him great inconvenience in swallowing and breathing. He spent the winter of 1893–94 in Florida, and was very much benefited. His fever soon left him, and the glands were reduced in size. Returning to his home his old symptoms soon reappeared, and he again lost strength. The next winter (1894–95) he spent in Florida, but gained less benefit than before. He recovered considerable strength, and the glands in his neck again subsided. During the following summer he had occasional periods of fever, but with less enlargement of the glands. He said he passed blood with his urine occasionally. His appetite and digestion were good at all times; had had no palpitation or shortness of breath; during the periods of fever he had intense headache.

On March 31, 1896, I saw him for the first time. He had been having fever for about two weeks, the temperature ranging from 99° to 103° F.; he was greatly emaciated; had severe headache, and his mind was a little confused; he had a good color and appetite, and his digestion was good. There were three or four glands on the left side of the neck as large as almonds, and two on the right side; there was no enlargement of the axillary or inguinal glands. Examination of the heart and lungs was negative. He exhibited slight tenderness over the liver; the spleen was palpable, extending two inches below the costal margin. He had no leucocytosis. The urine was normal; the temperature 103° F.; the pulse 74.

His fever continued through April, never touching the normal point until May 1, 1896. He was made much more comfortable by cold sponge-baths. His digestion had been good, and he was allowed a liberal diet. After his fever disappeared he showed considerable prostration, but soon began to improve, and gained much flesh and strength. May 19th showed the next rise in temperature. From this time the temperature was charted, except during the periods when the patient had no fever. His digestion was now poor. June 1, 1896, there was noticed a slight bronzing of the skin of the forehead, and to a less extent on the chest and abdomen. The temperature did not touch the normal point from June 1st to July 2d, as shown by the chart. From July 2d to July 20th his temperature occasionally reached 103.5° F., when it again dropped to normal. At this time there was a little effusion in the abdominal cavity. August 3d his abdomen was tightly distended with fluid; this was tapped and about one gallon of milky fluid was removed. August 13th the abdomen was again full and about the same quantity of fluid was removed. August 25th the patient was anxious to be tapped again, as the abdomen was very full; but at this time he began to pass large quantities of urine, which kept up during the next three days, and all the fluid in the abdomen disappeared. His fever subsided and did not again reappear until September 30th. From this time it kept up, as shown by the chart, until November 27th. November 15th there was again slight distention of the abdomen; he was tapped November 19th. After this he failed slowly, and died December 4, 1896. Only a partial autopsy was allowed.

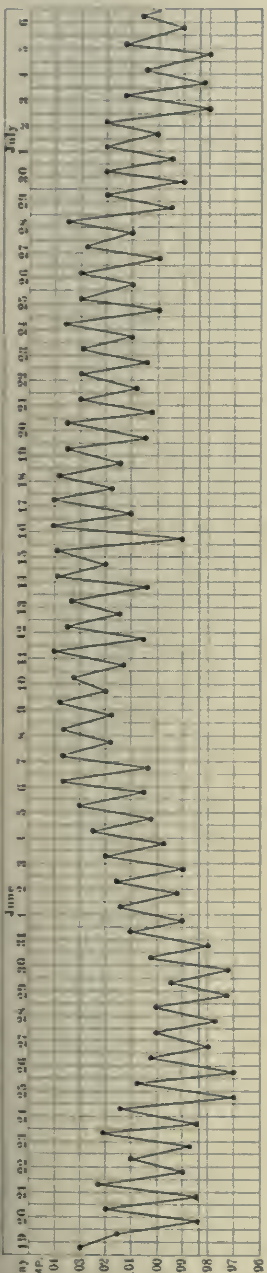
I append the report, kindly made to me by Dr. Simon Flexner, of Johns Hopkins University, of the tissues removed:

"I have made sections from several pieces of the tissues which you sent me. The spleen contains the greater amount of tumor formations. The liver showed no actual tumor nodules, but in the capillaries I detected an occasional cell like those that occur in the tumors. The type of sarcoma is not the ordinary lymphoid one; the cells are not chiefly of the lymphoid variety, but show a great variety of size and form. Some may be round; more are oval, and many have compound (multiple) nuclei. The large number of multinucleated cells is one point of difference from the usual type of lymphosarcoma, and other variations are the almost complete absence of the smaller lymphoid cells, as well as a suggestion of reticulum between the cells such as occur in lymphomata. In the spleen the nodules are very little circumscribed; they pass over into the splenic tissue more or less freely, and single cells of the kind found in the nodules occur at removed points among the normal splenic elements.

"The largest node I have seen exists in what I take to be the sheath of a large branch of the splenic vein. It passes into the organ along the cellular tissue spaces, but in the section has not invaded the vein itself.

"I have encountered two such cases during the past two years, and possibly a third one, combined with tuberculosis. I had hoped to complete their study for publication before now, but I have not yet been able to do this.

"While I have hesitated to speak of these tumors as lymphosarcoma, the clinical picture of the case is so conclusive of Hodgkin's disease that no other course seems open. If, however, such cases are to be regarded as Hodgkin's disease our conception of the pathology of the affection must be widened.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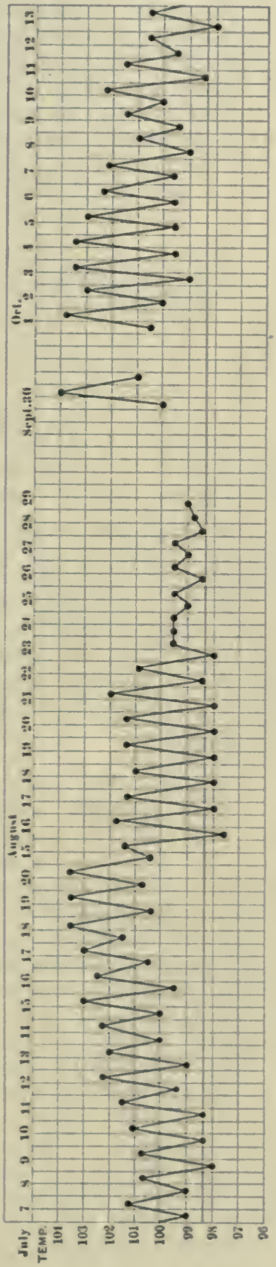
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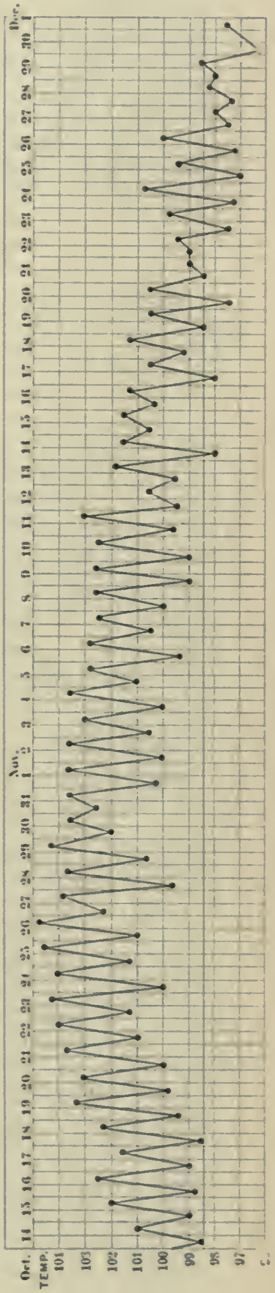
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"The cases are, after all, examples of lymphosarcoma, excepting that the type of the new tissue differs much from lymphoid structures and agrees better with what is usually denominated mixed-cell sarcoma. In the review of the literature which I made four or five years ago I do not remember to have found similar cases described. I do not, however, see that any other designation than Hodgkin's disease, or one of its synonyms, is applicable to the symptom-complex of this disease, and, therefore, this name, or lymphosarcoma, must be applied to the pathological process."

A CASE OF ACUTE GANGRENOUS PANCREATITIS, WITH FAT NECROSIS.[1]

By J. A. Scott, M.D.,
OF PHILADELPHIA.

Since the monograph of Fitz[1] on "Acute Pancreatitis" was published in 1889 considerable careful clinical observation has been made upon pancreatic diseases. During the last twelve months three important contributions have been made to the subject, and the list of reported cases considerably increased. Korte,[2] in the *Deutsche Chirurgie*, Lieferung, 45 D., has published a monograph, with special reference to the surgical aspect of pancreatic diseases. In Nothnagel's *Special Pathologie und Therapie*, Bd. xviii., Oser[3] has written a comprehensive article, with full bibliography. In January of this year Lancereaux,[4] in his treatise upon diseases of the liver and pancreas, gives a complete account of all pancreatic diseases.

I desire to report the following case of pancreatic disease because of the comparative rarity of the condition, and the presence of some rather unusual symptoms.

Mrs. A. B. G., Hospital No. 1097, aged sixty-four years, white, married, was admitted into the private ward of the Pennsylvania Hospital August 1, 1898. Her father and a sister had died with chronic renal disease. Her mother had always been healthy, and died of senility. The patient's personal history was as follows: She was an active worker in charitable and philanthropic societies; her general health had been good, but during the last ten years of her life she had been rather a frequent sufferer with gastro-intestinal attacks, which were characterized by pain and distention of the stomach. Her physician has told me that she did not seem able to digest starchy foods. These attacks would, however, pass off in a few days' time, when she would be as well as usual. In 1895–96 she had an illness, during a portion of which she was a patient at the German Hospital. This sickness was characterized by constant pricking sensations over the entire body, but especially marked about the neck, shoulder, and trunk She became much emaciated, and did not recover until she tried a change of climate, going to Glenwood Springs, Colorado, and taking medicinal baths at that place. It seems to me that this must have been a neurosis, and had no connection with her subsequent illness. Prior to the present sickness she had been working extremely hard, her digestion had not been good, and she seemed rather mentally depressed. For a week or ten days before her sickness she was obstinately constipated, with swelling of the abdomen and some flatulence. The present attack began suddenly, about half-past eleven at night, between four and five hours after the ingestion of food. Following her supper, which she had about six o'clock, she spent the evening with some friends; shortly after going to bed she was seized with a violent pain in the pit of the stomach; the abdomen became tender and swollen; she belched large quantities of gas and vomited copiously. Her attending physician administered morphine that night, and again on the following day, and the pain was considerably allayed. The bowels, which had not been moved for six or seven days, now became loose, and were moved almost constantly, the stools being dark and rather liquid. Twenty-four hours after her illness began she became delirious, or, as her physician said, went into coma. On the fifth day of her illness she was sent to the hospital. Upon examination her condition was as follows:

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[1] Read before Medical Section, College of Physicians, May 8, 1899.

She was a well-nourished woman, weighing probably 160 pounds. She was very restless, constantly shifting her position. Her temperature was 102.2°; pulse 88, soft, rather small, irregular, and intermittent; respiration 24. Her mental condition was interesting; she seemed to understand questions asked, and answered them in a coherent manner, but would then begin to talk or sing to herself. It was, therefore, not possible to assure one's self that her replies were accurate. Her condition resembled a mild mania. Her tongue was moist, with a brownish coat. There was no jaundice present; the pupils were contracted to almost pin-point size, and so continued. The heart's action was irregular and intermittent; abortive systoles were frequent. At the apex the first sound was impure; no murmur was heard. The belly was tightly distended with gas. The skin was red, evidently from counter irritation. On palpation at this time no tenderness was elicited in the epigastric region; no tumor or mass was felt. The liver and spleen were normal in percussion area. The urine, which always had to be withdrawn by catheter, was diminished in amount and continued to be so—twenty-six ounces in the first twenty-four hours; it was light-yellow, 1012, containing neither albumin nor sugar, but microscopic examination showed many hyalo-granular, dark granular, and fat casts, and a few leucocytes. At one subsequent examination there was a suspicion that sugar was present. Subsequently a trace of albumin was found, with a large number of dark granular casts. During the first twenty-four hours the bowels moved nine times; the stools were liquid, dark in color, and did not contain fat. After three days there seemed to be some improvement in her physical condition. The belly was slightly tympanitic, and she winced on palpation over the right lobe of the liver. The talkative delirium persisted, and the temperature remained 101°. The diarrhœa had now ceased, and several formed brown movements were passed. Five days after admission the belly had become soft, but the patient was stuporous, and winced when the epigastric and hepatic areas were palpated. There were a few suspicious, lenticular, rose-colored spots on the chest and bosom. Diarrhœa again set in, the stools being dark-green, and containing a considerable amount of mucus. The patient was rapidly losing flesh and strength.

At times her pulse was almost imperceptible, and the extremities and face cyanotic. The blood examined upon this day gave a positive Widal reaction. Upon the succeeding day, or the seventh in the hospital, there was slight improvement. The abdomen was softer, and a doubtful mass, several inches in diameter, and extending across the epigastric region, was felt. Upon the subsequent day the Widal test was again positive. The patient gradually sank, and died in the early morning hours of exhaustion—the tenth day in the hospital and the fifteenth day of her illness.

The autopsy was made about six hours after death. The brain and spinal cord were not examined. The body was that of a medium-sized, fairly well-nourished woman. The skin was very pale. The right heart was full of clotted blood and the ventricle flabby. The heart was normal, except a slight thickening at the base of the mitral and aortic valves. A slight degree of hypostatic congestion was present at the base of each lung. An old puckered cicatrix, probably tuberculous, was found at the apex of the right lung. Upon opening the abdomen I was at once struck by the numerous areas of fat necrosis in the omentum, and began to investigate the pancreas. A localized peritonitis existed; the smaller bowel was here covered with lymph in the epigastric region, and was matted together by rather recent fibrinous adhesions; this made a covering for a mass which was subsequently made out to be the pancreas. There was a small amount of turbid sero-sanguinous fluid in the peritoneal cavity. Through the omentum, mesentery, and mesocolon were hundreds of necrotic areas (fat necrosis), varying in size from that of a pin-point to that of a split-pea. They were yellowish-white in color, raised above the surface, with slight inflammatory areas around them. Sometimes two such spots would be confluent. When the adherent coils of the smaller bowel were raised up there was behind them a localized collection of turbid fluid, which was bounded in front by the bowel, above by the stomach, and below by the pancreas. This was unquestionably purulent exudate into the lesser peritoneal sac. The pancreas itself was enlarged to about three times its normal size, its head projecting into the duodenum. It was soft, and was with difficulty examined, because of the adhesions, and the abscess of which it was the lower boundary.

On section of the head and body of the pancreas, they were found in some areas bright red and in others coal-black in color. The tail was less affected than the body and the head. In many areas the pancreatic tissue was entirely gangrenous. There was no obstruction or calculus in the duct. The hemorrhage into the pancreas had not been large in amount, and extravasation into the surrounding tissues had not taken place. There was no inflammation or ulceration of Peyer's patches. There was no perforation of the gut. The appendix was normal. The spleen was small, soft, pliable, and intensely congested. The liver was large and fatty. The gall-bladder contained three facetted gallstones, one the size of a hickory-nut. The kidneys were fatty and contracted, the left containing a cyst the size of a large hen's egg, filled with a yellowish, slightly turbid fluid; the capsules stripped easily.

I had not, at the time of the patient's death, made a diagnosis in her case. I could see nothing upon which to base a definite opinion. The symptoms, now clear to me, were then obscured by the mental condition, and the results of the blood and urinary examination. I felt sure she had not typhoid fever; also positive that she was not uræmic, though appreciating that the kidneys were by no means normal. I was inclined to think that she had had previous intestinal obstruction, and that partial relief of the obstruction had taken place, and that we were dealing with a disappearing local peritonitis. The question of pancreatic disease was discussed, and the stools were watched, but nothing was gained from this. No tests for suppression of the pancreatic secretion were used. I could not entirely account for the unusual mental condition, and felt certain that the patient had an illness of a grave character.

Cases of acute pancreatitis are comparatively rare. Of the hemorrhagic variety Korte has collected 41, only 4 of these occurring in women. The hemorrhagic cases may be followed by suppuration of the gland—acute suppurative pancreatitis. Fitz, in his monograph in 1889, reported 22 cases, and to this list Korte has added 24. Gangrene or necrosis may follow either inflammation, hemorrhage, or suppuration of the gland. Of acute gangrenous pancreatitis Fitz has reported 15 cases, and Korte has increased this number to 40. I have gone over the records of the Pennsylvania Hospital for the past ten years (1888 to 1898), and, barring cases of primary cancer of the pancreas, of which there are a few, found no cases of acute pancreatitis recorded. There was one case (Hospital No. 1353, 1897) of pancreatic cyst in a woman, who was operated on by Dr. Thomas G. Morton. The fluid secured was yellowish; it converted starch into sugar and emulsified fat. This patient recovered. I have gone over the records of the post-mortem room since authentic records have been kept (1876), and have found, excluding cancer of the pancreas, but one additional case of acute pancreatic disease. I will give a brief history of this case:

A. F., male, aged thirty-four years, Hospital No. 714, admitted July, 1894. The patient was a rather stout young German, who used alcohol freely. Two days before admission to the hospital he complained of abdominal pain. The bowels had been moved four times on each of the previous two days. Upon admission to the hospital the man was dull; the temperature was 102.4°. It dropped the following morning to 99°, and then to normal. There was an increase of resistance, with dulness on the right side of the abdomen and tympany on the left. No mass was made out. After admission to the hospital the bowels were constipated; he vomited and retched considerably. A movement was effected with castor-oil. The urine was 1018, and contained no albumin or sugar. The man was evidently very ill, and on the third day he died, his temperature rising to 102° before death. The post-mortem showed a wide-spread fat necrosis, with the following changes in the pancreas: A hemorrhage into the gland, almost doubling its size; the pancreas was dark red in color and necrotic in areas. The changes in the gland were most marked in the head and body; the tail was but little affected. No marked pathological changes were found in the other organs.

On the other hand, however, acute pancreatitis seems to be becoming more clearly recognized or more prevalent. On December 8, 1898, before the Clinical Society of London,[5] there were reported seven cases of acute pancreatitis, and two cases of pancreatic calculi. Two other cases were also mentioned during the discussion. I know that within the last two years Dr. William Pepper had seen and diagnosed two cases of acute pancreatic disease, both of them being associated with pre-existing liver disease. I believe these cases will subsequently be reported. I have found in the report of the Presbyterian Hospital for 1898 one case of acute hemorrhagic pancreatitis. I do not find, however, that the question of acute pancreatic disease has been presented in the last decade to the College of Physicians or to the Pathological Society, though prior to 1890 Drs. Pepper, Osler and Hughes, Formad, Musser, and Starr have made contributions on that topic.

The disease is not commonly diagnosed. Dr. Osler in his last edition states that Fitz and Thayer have made the diagnosis intra vitam. I have seen the diagnosis of hemorrhagic pancreatitis made upon the operating table because of the presence of multiple areas of fat necrosis in the omentum (a case quoted by Osler), but the patient recovered, and was living four years later, when he had a recurrence. At the present time, however, cases of acute hemorrhagic pancreatitis have been sufficiently studied to enable us to form a fairly good clinical picture of the symptoms. Such cases usually occur in persons over fifty years of age, who are heavy-weights, and especially those who have used alcohol to excess.[6] The major portion of these cases have occurred in males, many of whom had a previous history of gastric and intestinal upsets. The illness begins suddenly, with severe colicky pain in the epigastric region, the symptoms usually appearing shortly after the ingestion of food, or at the beginning of the digestive process.[7] The pain does not radiate toward the left shoulder (Lancereaux); vomiting follows almost immediately. The vomited material may be copious, cosisting of partially digested food or slimy matter. It may become green or black, and sometimes contains a little liquid or clotted blood.[8] According to Lancereaux, the vomit is bilious and usually acid. Symptoms of collapse soon follow. There may be some tenderness or increased resistance over the pancreatic area. Fitz considers the presence of localized spots of tenderness over the abdomen of great diagnostic value. They are probably due to areas of fat necrosis. The temperature for the first twenty-four hours is normal or subnormal, but apt to rise after this to 100° or even to 104°. The belly usually becomes distended. The bowels are generally constipated, sometimes with alternating diarrhœa. The urine, which may be very abundant at the beginning of the attack, becomes much reduced in quantity. It may contain albumin and casts; sugar has been found. A mild delirium is sometimes present. A severe case usually terminates at the end of the third or fourth day in death. It is thus seen that these cases are similar to those of poisoning by irritant chemicals. Lancereaux cites the case of a large, fleshy woman, in whom death was preceded by convulsive movements, and in which the course was so rapid that he thought the case might have been poisoning by cyanide of potassium. Zenker compares the onset to the symptoms which follow a blow upon the pit of the stomach.

If, however, the case does not terminate fatally within the first three or four days we may be dealing with another form of pancreatic disease—namely, either the suppurative or the gangrenous. The symptoms then become those of a localized peritonitis; the belly becomes more tympanitic, the temperature slightly irregular, and the bowels may now become diarrhœic. A mild delirium is usually present. The urine is usually albuminous and lessened in quantity. Sugar has been found, and if the infection has taken place through the pancreatic ducts, and not through the blood (an important distinction according to Lancereaux), sugar is usually present. Emaciation begins and may become extreme. The abdomen may soften enough to reveal a mass on palpation in the epigastric region. Hiccough may be present, and not infrequently the patient is jaundiced. The stools, if examined, may show the presence of fat, and, if meat diet is used, an excess of undigested muscle fibre.[9] Fat may also be present in the urine (lipuria), and indican is sometimes found.

If gangrene follows acute pancreatitis, more or less of the entire gland is transformed into a gray mass with a tendency to become spongy, and to form a slough, which in some cases is attached to the abdominal wall by only a few shreds of tissue. The omental bursa (the lesser sac of the peritoneum) is not infrequently the seat of blood-stained fluid, or a large cyst in which masses of necrotic fat may be found (Fitz).

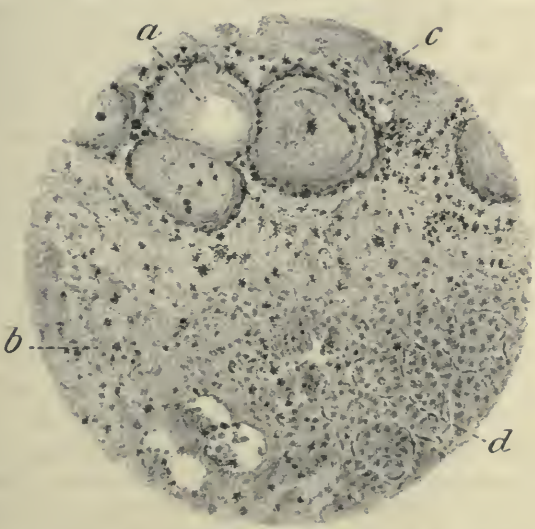
The post-mortem findings, therefore, in these cases are in brief as follows:

If hemorrhage has taken place the pancreas may be enlarged to two or three times its normal size with hemorrhagic infiltration. The blood is sometimes infiltrated into the surrounding tissues, or but a portion of the gland, usually the head or body, is involved in the hemorrhagic process. The pancreatic tissue is in areas bright red, in others black, dependent upon the duration of the hemorrhage. The cause of the hemorrhage is as yet in doubt. Fitz has not been able to discover, after careful examinations, the rupture of any bloodvessel in the gland. Lancereaux believes, however, that the bleeding takes place from miliary aneurisms, such as are frequently found in the brain and lungs of tubercular or syphilitic patients, and that have been overlooked in the examination of the pancreas Warthin,[10] who has recently studied the minute pathology of acute pancreatic disease, finds all the bloodvessels, especially the veins and capillaries, much degenerated, and considers that the hemorrhage is due to a diapedesis. The severity of the symptoms produced (pain, colic, etc.) is probably the result of pressure upon the solar plexus. The microscopical examination of these nerves has shown distinct degenerative changes. Attending this state of the pancreas, and in the inflammatory conditions, subperitoneal areas of fat necrosis, varying from the size of a pin-head to that of a pea, are always found in the omentum, mesocolon, and mesentery. This necrosis may be so excessive as to be found in the perinephritic and pericardial fat (Warthin).

Fat necrosis is always observed in the pancreas. This fat necrosis (so called by Balser) we find in this and in no other condition, though Osler states that it has been accidentally found in operations for ovarian tumors, and in lean people who have gallstones. The fat necrosis, which is so widely scattered, is generally supposed to be due to the action of the fat-splitting ferments which have been found in the necrotic areas by Flexner. Experimentally, Williams, Hildebrand, Flexner, and Hlawa have reproduced the hemorrhage and fat necrosis —Flexner by the injection of acid and alkali solution into the veins of guinea-pigs. His conclusions were that the necrosis was not produced by the acid solution used. Carnot[11] has repeated these experiments with papain and diphtheria antitoxin, and secured results identical with the above. Warthin, because of the wide-spread necrosis, the fact that bloodvessel degeneration is extreme, and that degenerated red cells and thrombi are numerous, is inclined to think the necrosis is caused by an active hæmolytic poison, the result of disturbed metabolism.

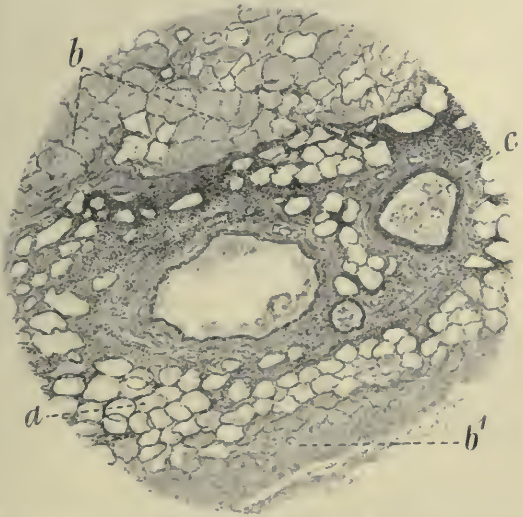
I will not enter into the minute pathology of the fat necrosis. The two illustrations which accompany the article show well the necrotic areas as they occur in both the pancreas and the omentum. The blood crystals from the hemorrhage into the pancreas show especially well, though they are of rather an unusual form, spiculated. These specimens were from sections made in the second case detailed above, and prepared at the Pennsylvania Hospital by Dr. Thomas S. Kirkbride, who kindly loaned them to me for study. The pancreatic specimen also shows, in several places, areas in which there appeared to be rather numerous bacteria, but which, upon closer inspection, are unquestionably fat crystals, the products of the fatty acids. I regret that I have not been able to illustrate this point.

FIG. 1.



Pancreatic necrosis.
a. Necrotic fat. *b.* Tissue necrosis. *c.* Hæmatoidin crystals in spicule form. *d.* Acini undergoing necrosis.

FIG. 2.



Fat necrosis in omentum.
a. Normal fat. *b.* Necrotic fat. *b*¹. Total tissue necrosis. *c.* Artery with thrombus.

If the inflammatory process goes on to suppuration, abscess, either single or multiple, is found in the pancreas.

If gangrene of the gland occurs the pancreas becomes mushy, grayish-black, may break down altogether, and is usually the boundary of a cystic collection of fluid in the lesser peritoneal sac. Fat necrosis is found in these two conditions. If a cyst forms in the lesser peritoneal sac the case may be one of many months' duration, for the cyst may become enormous. Upon examination of the abdomen it is usually found between the stomach and the transverse colon. A very good description of these cystic formations is to be found in Korte's work.

It can, therefore, be seen from the above statements that the diagnosis of acute pancreatitis is not made with ease. It is to be differentiated from, first, acute intestinal obstruction; second, perforating gastric or duodenal ulcer; third, hepatic colic; fourth, an irritant poisoning; and, fifth, thrombosis of the mesenteric vessels.

A careful investigation into the character of the patient's previous health will always be of great assistance in the diagnosis. It is not necessary for me to enter into detail. Acute hemorrhagic pancreatitis is differentiated from acute intestinal obstruction by the severity of the onset, by the absence in the early stages of distention of the abdomen, by the tenderness in the region of the pancreas, and by the infrequency of the obstruction of the bowel in the epigastric region.

It is differentiated from ulcer of the stomach by the absence of pain immediately after eating and the absence of blood from the vomit and stool; from gallstone by the seat of pain and tenderness, and the absence of previous attacks of hepatic colic and jaundice; from irritant poison by the absence of the history of ingestion and the examination of the vomit.

Thrombosis of the mesenteric vessels is rare. In the majority of cases the heart or abdominal aorta is diseased; there is usually incessant vomiting and diarrhœa, with rapid abdominal distention.

The prognosis of these cases is usually extremely grave; the majority of them have resulted fatally. There have been reported four or five recoveries after operation—one by Osler, before mentioned, one by Korte, one by Thayer, one by J. Langton, and one by Manges.[12] Manges' case illustrates very well the onset of pain after the ingestion of food, and shows that an exploratory laparotomy alone is of such assistance that recovery may take place. Troyfoyer's well-known case was living seventeen years after the pancreas had been passed by the bowel.

The best treatment, therefore, for acute pancreatitis consists in making a correct diagnosis and handing the patient over to the care of the surgeon. I believe the next few years will present more correct diagnoses, with a better percentage of recoveries from operation.[13]

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THE DIAGNOSTIC VALUE OF THE WINTRICH TRACHEAL SOUND.

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Moderate percussion over any portion of the normal thorax gives a sound of a certain character which is not modified by the patient holding the mouth open. If at the same time the examiner percusses the thorax he place his ear near the patient's nose he will perceive no difference in the character of the sound. Under normal conditions moderate percussion-vibrations are not communicated to the large bronchi, consequently the column of air in the trachea is not implicated in the percussion, and no sound issues from the nose.

Under certain pathological conditions the vibrations of a moderate percussion stroke will be communicated to the large bronchi, thus involving the column of air in the trachea. Under such conditions there will be two sounds conducted to the examiner's ear—one directly from the thorax through the atmosphere, the other through the trachea and nares or open mouth. Wintrich described the modification of the percussion note over cavities in the lung that occurred when the patient held the mouth alternately open and closed. When the mouth was opened the percussion-note became more tympanitic and clearer and higher in pitch, because the open mouth permits the pharynx to act as a resonator over the column of air in the trachea, which is set in vibration when the percussed cavity communicates with a bronchus. Williams noticed the same modification of the percussion-note over consolidated areas of the lung at the apices and also over the upper thorax when the lung was compressed from pleurisy with effusion. In both consolidation and compression of the upper lobes of the lungs the consistency of the lung is increased, so that the vibrations from moderate percussion are communicated to the large bronchi and trachea. The implication of the column of air in the trachea can be recognized when the patient's mouth is closed if the examiner will compare the sound as transmitted directly through the air to his ear with that heard when the ear is close to the patient's nostrils. In cases of moderate infiltration of the apices of the lung, when the characteristic Wintrich tracheal sound cannot be demonstrated by having the patient hold the mouth alternately open and closed, one may recognize a distinct difference in the sound heard at a distance and heard at the patient's nostrils. The sound heard at a distance is dull, high in pitch, and short in duration; the sound at the nostrils is tympanitic, high-pitched, and longer in duration. One can easily recognize the sound as issuing from the nares with moderate percussion.

This modification of sound is not demonstrable by light percussion over the bases of the lungs when consolidated, because of the remote position of the larger bronchi. In cases of infiltration at the base of the lung, when the thorax is percussed by striking a firm blow with the palmar surface of the ends of the metacarpal bones, the tracheal change of sound can be demonstrated, provided the bronchi are not stopped. This sign may in some instances be of service in differentiating between pulmonary consolidation and pleurisy with effusion. I have been able to demonstrate this phenomenon in several cases of miliary tuberculosis and lobar pneumonia, but never in pleurisy with effusion or hydrothorax.

When the percussion vibrations are readily communicated to the tracheal column of air, in either consolidation or cavity formation, this relation can be appreciated by the percussing finger as well as by the ear. The following experiment will illustrate this statement: Let the examiner percuss the supraclavicular space, holding his eyes closed during the experiment. The patient is instructed to hold the mouth closed, and an assistant will close the patient's nostrils from time to time while the examiner is percussing. The examiner can tell when the patient's nostrils are closed, though the sound is not modified as it reaches the ear. He recognizes the closure of the nostrils by a perceptible increase of resistance to the percussing finger. I have been able to do this successfully in cases of pneumonia at the apex as well as in cases of tubercular cavities at the apices. This experiment gives one a good conception of the accessibility of the tracheal column of air when the consistency of the intervening medium is increased.

Thus far we have dealt with the tracheal sound only as it occurs in consolidation, compression, and cavity of the lungs. In a normal adult percussion over the upper portion of the sternum will not give a tracheal sound, because the inflexibility of the sternum and the softness of the tissues intervening between the sternum and the trachea are unfavorable for the transmission of vibrations to the trachea or bronchi. If the medium between the sternum and the trachea be increased in consistency a light percussion stroke over the manubrium will give a tracheal tone as clear as that heard over a cavity at the apex. The following case is a good illustration of this fact.

An old inmate of the infirmary was brought to the City Hospital, complaining of dyspnœa. Physical examination revealed moderate cyanosis and dyspnœa; temperature 101° F. The entire left thorax was dull, increasing to flatness over the lower portions, with great resistance to the percussing finger; respiratory excursion diminished. The palpable fremitus was diminished over the upper portions and absent over the base of the thorax. There was loud bronchial inspiration and expiration, attended with medium moist and dry râles over the upper thorax. Over the lower portions there was distant bronchial inspiration and expiration. The heart was not dislocated to the right. There was no distention of the jugular veins and no œdema of the head or neck. There was no enlargement of the palpable lymph-glands. Over the left thorax a tracheal tone was demonstrable on percussion over the supraclavicular and infraclavicular, the suprascapular and the left interscapular regions. Here were all the signs of a pleurisy with effusion, with attendant compression of the lung, and the findings made such a diagnosis necessary; but during the examination it was noticed that the tracheal sound became much more distinct as we percussed toward the median line. Though the manubrium was not markedly dull or resistant on percussion, the tracheal sound attending percussion of the manubrium was much more distinct than over the apex of the lung. On this sound alone a diagnosis of mediastinal tumor with transudation in the left pleural cavity was made. About four pints of serum were aspirated from the left pleural cavity. This did not affect the percussion-note over the manubrium; the tracheal sound remained as distinct as before the fluid was removed. Percussion in the left interscapular region gave the same tracheal sound.

The autopsy revealed a lymphosarcoma, the size of a large fist, occupying the mediastinum. Since this case was seen I have had frequent opportunities to study the tracheal sound over the apices in bilateral consolidations and in pleurisy with effusion. In no instance was there a tracheal sound produced by percussing over the manubrium, though percussion in the supraclavicular and infraclavicular spaces gave a distinct tracheal sound.

This case was seen in August, 1897. Since that time four more cases of sarcoma of the mediastinum have come under my observation. In all but one a distinct tracheal sound attended percussion over the manubrium. The one which failed to give the tracheal sound was in a child, four years old. There were in this instance several other indications of mediastinal tumor, such as fever, dyspnœa, free fluid in the left pleural cavity, dulness over the manubrium, and enlarged lymphatic glands in the axilla. The relative position of the tumor and trachea as found at autopsy did not explain the absence of the tracheal sound. The only possible explanation to my mind is that the child instinctively closed the glottis whenever the manubrium was percussed, though the precaution was taken to percuss during inspiration.

In two of the remaining three cases there were evidences enough beside the tracheal tone to make the diagnosis. Though the autopsy in both instances revealed large lymphosarcomata filling the mediastinum, the tracheal sound could be demonstrated only during forced inspiration During expiration not the slightest suggestion of it could be elicited. During forced inspiration the Wintrich change was as clearly defined as it would be over a large cavity in the apex of the lung. The explanation for the sound being demonstrable during inspiration only may be found in the descent of the trachea and tension on the structures in the mediastinum during the act of inspiration. In this manner the tumor is possibly brought into more intimate contact with the sternum, thus favoring the production of the tracheal sound. The autopsies, however, showed the trachea to be surrounded by the neoplasms, and the neoplasms were firmly adherent to the sternum. It is very difficult to understand how the inspiratory act should be necessary for the production of the phenomenon when the relative positions of the parts as found at autopsy seem to present all the conditions required for the tracheal sound.

Aneurisms of the first portion of the arch of the aorta will give the tracheal sound as distinctly as do solid tumors. I have had the opportunity to demonstrate this sign in four cases of aneurism of the first portion of the arch. In every instance the sound could be brought out during deep inspiration only. In one case it disappeared after a few weeks' rest in bed. With the disappearance of the tracheal sound there were also modifications of other physical signs, which indicated a diminution in volume of the aneurismal sac. This patient left the hospital much improved, but died suddenly several months afterward, and was autopsied at the coroner's morgue. The examination revealed a thin-walled aneurismal sac of the ascending arch, which was not larger than a hen's egg.

Another very unique case in which the tracheal sound was of great diagnostic service was one of pericarditis with effusion, which presented considerable difficulty for differential diagnosis from pleurisy with effusion and pneumonia with mediastinitis.

By percussing lightly over the sternum at Louis' angle a distinct tracheal sound was demonstrable during forced inspiration only. The tracheal sound could be produced only by percussion over a sharply defined area. This area extended on the sternum three-quarters of an inch above Louis' angle to three-quarters of an inch below the angle. Over the left infrascapular area of dulness, which commonly occurs in pericarditis with effusion, percussion was accompanied by a distinct tracheal tone. It was, however, unaffected by the respiratory phases. The tracheal sound in the two positions referred to were due to different causes. That brought out by percussion over the infrascapular area was due to percussion over a compressed lung, while the tracheal sound produced by percussion of the sternum was caused by the pericardial cul-de-sac (formed by the reflection of the pericardium over the large vessels at the base of the heart) being distended with fluid.

The cul-de-sac occupies the anatomical position over which the tracheal sound was produced. This sac of fluid lay between the sternum and the bifurcation of the trachea. During forced inspiration the bifurcation of the trachea would be pulled downward into more intimate contact with the pericardial sac, and thus favor the transmission of the percussion vibrations through the sac of fluid to the large bronchi. Paracentesis was made in the fifth interspace, half an inch to the right of the sternum. About eight ounces of bloody serum were withdrawn from the pericardial cavity, and directly afterward the Wintrich tracheal sound on percussion over the sternum disappeared.

The question may be raised as to whether the Wintrich or the Williams tracheal tone may not occur with percussion over the manubrium in normal cases. So far I have found only one patient in whom the tracheal sound could be elicited by moderate percussion over the manubrium, and in whom there was doubt as to the existence of a mediastinal mass. This patient complained of dyspnœa and some difficulty in swallowing. No other signs of mediastinal tumor were present. The case was lost sight of, so whether this instance is an exception to the rule or not must remain in doubt.

There are several precautions to observe in testing for the tracheal sound where mediastinal involvement is suspected. The chin should be elevated to produce as much longitudinal tension as possible on the trachea; this seems slightly to favor the sign. Then, too, if a patient is told simply to take a deep inspiration, at the height of the inspiration the glottis is instinctively closed, as in this way the thorax is maintained in the inspiratory phase with the least possible effort; and if the vocal cords are approximated all sounds from the trachea are cut off and the tracheal sound will not be audible.

The patient should be instructed to take a deep breath and continue the inspiratory effort after the thorax has reached the height of its excursion; by so doing the vocal cords are kept apart and the passage of sound and air from the trachea is not obstructed.

One should have the patient hold the mouth open, with the tongue protruded. The examiner should percuss gently over the manubrium, and continue this throughout the act of inspiration. He should place his ear directly before the patient's mouth. When the tracheal sound is present it can be easily recognized by its characteristic metallic resonance and issuance from the mouth. The sign when present is so striking that the most inexperienced investigator could not fail to recognize it.

The tracheal sound is produced by percussion over the upper portion of the sternum whenever there is a solid or liquid mass which will communicate the percussion vibrations to the bronchi. This will occur in mediastinal tumor, aneurism of the ascending arch of the aorta, and pericarditis with effusion, provided there is a sufficient amount of fluid to distend the pericardial cul-de-sac over the origin of the large vessels at the base of the heart.

The tracheal sound from percussion of the manubrium is not present in consolidation or cavity of the upper lobes of the lungs, nor is it present in pleurisy with effusion.

In searching medical literature I can nowhere find any mention of this sign in connection with tumor of the mediastinum. It has been of considerable service to me in differential diagnosis. It should be of assistance to the surgeon in determining upon the advisability of operation on tumors of the neck

SPLENIC PSEUDOLEUKÆMIA (ANÆMIA SPLENICA; SPLENOMEGALIE PRIMITIVE),

WITH THE REPORT OF A CASE.[1]

By Bertram W. Sippy, M.D.,
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The object of this article, briefly stated, is (1) to further the recognition of a very rare and fatal disease, to which the term splenic pseudoleukæmia seems most applicable; (2) to contribute to its symptomatology and pathology; (3) to record the results of experimental research, employed with a view of determining its nature and etiology; (4) to present reasons why, in the light of our present knowledge and experience, the removal of the spleen is the treatment to be advised when the diagnosis is certain and the conditions not especially unfavorable.

Report of Case. Anton B., Russian, aged forty-five years, was referred to my clinic at the Post-graduate Medical School of Chicago by Drs. Alexander H. Ferguson and G. Burdick, on April 16, 1898.

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[1] A critical summary of the literature on this disease, by the same author, will be published in a subsequent number of the Journal.

The following history was obtained: *Family History.* Mother died of old age; father died of unknown cause; no tuberculosis in the family, to his knowledge. *Personal History.* The patient has not had malaria nor has he lived in a malarial district; he has not had syphilis nor gonorrhœa; his wife had five healthy children and no miscarriages; he has not had typhoid fever or any previous illness since grown up, and never used alcoholics. He came to Chicago nine years ago, and has not lived outside the city since. Was always strong and healthy. About three and a half years ago he noticed a swelling in the left hypochondriac region. The mass was firm, but not painful on pressure or otherwise. At about the same time he also noted that he was easily fatigued. Shortly after this he complained of slight nausea, and vomited occasionally. His appetite soon became impaired, and it has not been good since. About three and a half years ago, or at about the time the swelling in the left side was first noticed, the patient had diarrhœa (three to four stools daily), which continued for nearly six months. Since then he has been rather constipated. Has had chilly sensations now and then, followed by fever; no distinct chill was ever experienced. This disturbance in temperature was not accompanied by pain, nausea, or vomiting. The patient has complained of shortness of breath from about the time the swelling was noticed, and this has gradually increased; now and then dizziness and headache have been present. Palpitation of the heart has not been noted; pain on breathing has never been present. Epistaxis began about two years ago, and since then has often been repeated; it has varied in amount from a few drops to a tablespoonful; previously the patient seldom had nose-bleed. The feet and ankles began to swell about one month ago, and since then have not been free from swelling. He has noticed a gradual growth of the tumor in the left side. The greatest local discomfort he describes as a feeling of fulness and pressure in the epigastric and left hypochondriac regions. He has never experienced pain in any portion of the abdomen. He has lost about twenty-five pounds in weight, and is not able to walk more than a very short distance without experiencing fatigue and dyspnœa.

Physical Examination. Patient rather poorly nourished; slight subicteric hue of skin and conjunctivæ. The mucous membranes show evidence of anæmia. The skin and finger-tips present the peculiar pallor of a moderately profound anæmia. Ears and nasal cavities negative; mouth and pharynx negative; tonsils normal size; glands at base of tongue not enlarged; laryngoscopic examination negative. The bloodvessels of the neck pulsate very distinctly. There are no glandular enlargements in the cervical region. A small kernel is palpable in the right axillary region. The inguinal glands of both sides are very slightly enlarged, but not more than is frequent in men. Œdema of the lower extremities in moderate degree extends from the feet to within a few inches below the knees; there is very slight œdema at both wrists. When examined in the recumbent position the costal arch in the left infra-axillary region is somewhat bulging, and the left side of the abdomen appears distended with a uniform mass. A fulness is apparent in the epigastric region. On palpation, corresponding to the visible enlargement in the left half of the abdomen a firm mass is to be felt, which apparently emerges from beneath the left costal arch. Its surface is smooth and its borders everywhere regular. The lower end of the structure is rounded and extends to within three fingerbreadths of the pubic bone. Below the umbilicus the mass extends an inch beyond the median line. One inch below the level of the umbilicus is a small depression or notch; above, the inner border disappears beneath the costal arch in about the parasternal line. The left border of the tumor, beginning below, lies parallel with Poupart's ligament, and above is indistinctly palpated in the lumbar region. One is able to grasp the lower pole as well as the inner border of the tumor. It moves with respiration in a diagonal direction, and the mass permits lateral movement. Pain is not experienced on deep pressure or otherwise. The mass is continuous with a dulness which extends to the sixth rib in the anterior axillary line and the eighth rib in the posterior axillary line. Intestine is not to be demonstrated between the structure and the abdominal wall.

All the requirements for the diagnosis of an enormous enlargement of the spleen are satisfied by the physical signs present in the case. Corresponding to the visible distention in the epigastric region a uniform mass can readily be made out, which emerges from beneath the costal arch and sternum and extends downward to within one and a half inches above the level of the umbilicus. From this point a very sharp, regular border may be traced well into the lumbar region on the right side. In the mammary line the lower border is about one hand's-breadth below the costal arch. The surface of this mass is smooth and firm and not painful on pressure. Respiratory mobility in a direction parallel to the long axis of the body is present. The upper border of the liver is in its normal position. It is evident that the mass in the epigastric and right hypochondriac region is an enlarged liver. Upon auscultation over the spleen a loud bruit is everywhere to be heard. No friction rub is audible over either the spleen or the liver. Slight ascites is present. There are no palpable retroperitoneal glandular enlargements. The examination of the lungs, aside from the dulness in the region corresponding to the enlarged spleen, shows a few moist râles in the infrascapular region of the left side. There is no increase in the size of the heart on percussion. The apex-beat is in the fifth interspace just inside the mammary line. A faint, systolic, accidental murmur is heard over the base of the heart. Genitals and rectum normal. Ophthalmoscopic examination shows no retinal hemorrhage. No tenderness of the sternum or any other bone is present. The temperature at the time of examination is normal. One would not hesitate to make a provisional diagnosis of splenic leukæmia on the history, signs, and symptoms present in the case. With such findings it would be extremely rare that the blood examination would fail to corroborate the diagnosis.

Examination of the Blood, April 17, 1898. Macroscopical appearance: Blood very pale and thin; coagulates slowly and imperfectly. Microscopical, fresh specimen: The red blood-corpuscles show only slight differences in their size, form, and color; no poikilocytosis; there is an evident paucity of cells; rouleaux formation is absent; there is no increase in the fibrin; leucocytes apparently not increased. Blood count: Red blood-corpuscles per cubic millimetre, 1,740,000; white blood-corpuscles per cubic millimetre, 5214; hæmoglobin (Fleischl), 30 per cent.; color index, 0.86. Stained specimen: Neither nucleated red blood-corpuscles nor abnormal forms of leucocytes found. Among 587 leucocytes the following relation of the different forms was observed:

Polynuclear neutrophile, 390 (66.4 per cent.); eosinophile, 5 (0.8 per cent.); transitional forms, 18 (3 per cent.); large mononuclear, 22 (4 per cent.); small mononuclear or lymphocytes 152 (25 per cent.).

During the following two weeks seven examinations of the blood gave practically the same results as those described. The urine was negative. I do not wish to enter into the details of diagnosis here, as I shall consider it in dealing with the literature in a subsequent paper. Suffice it to say that without difficulty one would be able to exclude neoplasm and echinococcus cyst. No cause for amyloid degeneration is present. Under the circumstances a malarial cachexia is not to be seriously considered. The causes of cirrhosis of the liver are absent, and the course of the affection has been unlike that of cirrhosis. The size of the spleen is greater than is found in that affection. The history and physical examination correspond accurately to the clinical picture of splenic leukæmia. In the absence of leukæmic blood findings there is but one diagnosis to be made, and that is splenic pseudoleukæmia. On April 25th thirty grammes of grape sugar were administered, which resulted in alimentary glycosuria. The patient came to the clinic from April 16th until May 7th, when he was admitted to the Cook County Hospital, in the medical service of Dr. James B. Herrick, to whom I now acknowledge my thanks for his kindness in allowing me to follow the clinical features of the case until the patient's death. When admitted to the hospital the patient's condition had not materially changed from that on the date of the first examination, with the exception that he was somewhat weaker. Iron, arsenic, and bitter tonics were administered, and the patient remained in bed the greater part of the time. The appetite did not improve; the man gradually lost strength and flesh, but no discomfort was experienced. The temperature was normal, with the exception of a slight rise now and then in the afternoon; the pulse-rate ranged from 76 to 120. The pallor, œdema, and ascites gradually increased. The condition of the blood did not change, with the exception of a gradual reduction in the number of red blood-corpuscles and in the amount of hæmoglobin. July 7th, a friction fremitus and rub was distinctly felt and heard over a small area of the liver in the epigastric region. Pain was present over the same area. July 14th, friction rub heard all over the portion of the liver exposed. Subcrepitant râles in the lower portion of the lung posteriorly. Temperature normal. Epistaxis now and then present. July 16th, splenic puncture; withdrew 10 c.c. of blood (see experimental research). Blood from the spleen was richer in leucocytes than the blood from the ear, but no abnormal elements were found. Examination of the blood taken from the ear of the patient July 17th: An average of 768 squares gave red blood-curpuscles, 568,000; white blood-corpuscles, 8000; hæmoglobin (Fleischl), 10 per cent. No marked change in the size and form of the corpuscles; no nucleated red cells; no abnormal white corpuscles found; the normal relation of the different forms was preserved. The slight increase in the white cells was probably due to an infection in the region of the parotid gland. A few days previous to the blood examination on July 17th a needle-prick in the lobe of the right ear continued to ooze thin, watery blood for more than one hour. No doubt infection took place at that point. July 28th, an abscess appeared in the parotid region; this was drained. No temperature. Spleen apparently growing smaller. Friction rub has disappeared from the liver region.

Involuntary evacuations began and continued until death. The patient gradually became weaker and the ascites increased. Dulness was noted over both lungs posteriorly, a condition of extreme marasmus was finally present, and the patient died August 17th at 6.45 A.M.

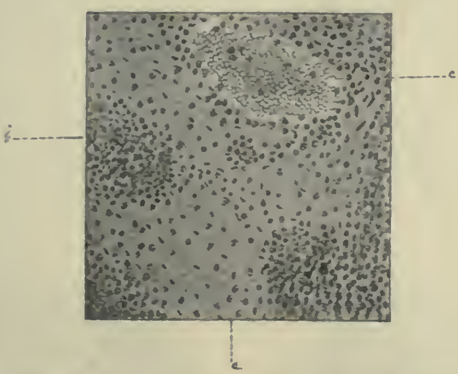
Autopsy, August 17, 1898, by Dr. E. R. LeCount, three hours after death. Body much emaciated; no rigor mortis; skin and conjunctivæ subicteric; opening in region of parotid gland, from which pus is escaping. Absence of fat in abdominal wall. Diaphragm at sixth rib. Spleen extends to two inches below crest of the ileum, anterior border on line of the middle of the left rectus. Ascitic fluid present in large quantity. Liver extends to crest of ileum on the right side. Both pleural cavities contain yellow fluid. Right pleura slightly adherent at centre of lung. Lungs: Right, no area of consolidation; part of lower lobe non-crepitant; contains icteric fluid. Left lung same as right. Peribronchial lymph-glands not enlarged. Heart: Valves competent; endocardium smooth and pale, with ecchymoses beneath; myocardium firm, light colored, uniform in consistency and appearance; aorta negative, with the exception of slight atheroma.

Retroperitoneal glands are small and pinkish and form a chain about the abdominal aorta. On section they are firm and grayish-red; they show no softening and no yellow areas; they have the appearance of true hyperplasia. Spleen: Weight, 2350 grammes; 31 x 16 x 9.5 cm.; smooth surface, bluish-gray; small whitish areas in capsule. On section, red, firm, and uniform. Wedge-shaped areas under capsule, which contain blood. Other white, wedge-shaped areas, with hemorrhagic circumference. Malpighian corpuscles not visible; connective tissue apparently not increased. Kidneys negative. Bladder and urethra negative. Adrenals negative. Liver: Weight, 2800 grammes; 35 x 19 x 16 x 9 cm.; smooth outline, no adhesions. On section, lobular markings indistinct; structure is uniform and firm; consistency not increased; biliary apparatus negative. Pancreas pale. Mouth negative. Tonsils and glands at base of tongue not enlarged. Larynx and trachea negative. Stomach: Near the pyloric end are a number of minute, circular areas, with elevated, reddish centres, presenting polypoid growths. One, near the pylorus, is 1 cm. in height. Mucous membrane pale. Small intestines pale. No enlargement of the lymphatic apparatus of the intestine. Large intestine and rectum negative. Mesenteric glands slightly enlarged; no softening or yellowish areas. Skull reddish-pink; the bone is of hemorrhagic character. Meninges negative. Brain negative. Right axillary glands slightly enlarged, and correspond to the description of the retroperitoneal lymph-gland; those of the left axilla are enlarged, though less so. In each groin slight lymphatic enlargement is present.

Bones: The whole length of the femur is filled with dark-red material, soft in consistency. The bony structure is lessened; it corresponds to red marrow of the fœtal bone. Near the upper end of the femur an area of yellowish, hemorrhagic tissue is rather sharply differentiated from surrounding softer and redder lymphoidal tissue. Some fœtal condition of bone is found in the ribs, sternum, and small bones of the feet. All the bones were fragile, due to the invasion of the compact tissue with lymphoidal or fœtal bone-marrow. In the chest-wall (right side) a small nodule is found under the pectoral muscle between the mammary and axillary glands. Although slightly fibrous in character, it most resembles a lymphatic structure.

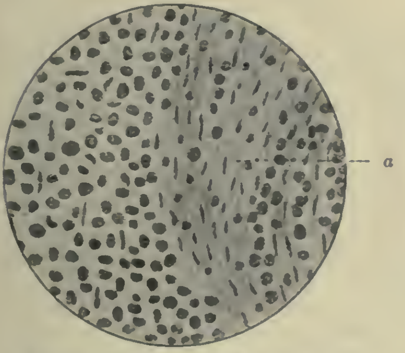
Histology. Spleen: The majority of the Malpighian corpuscles show only slight alterations. Many appear normal; others present a slight increase in the reticular tissue, and now and then a Malpighian body is found which shows considerable sclerosis. No marked degenerative changes are to be seen in the cells. The veins show a moderate increase in the connective tissue which surrounds them; areas are found where this increase is very marked. Fibrous tissues extend some distance into the splenic pulp, enclosing within its meshes lymphoidal cells, isolated and in groups (see Fig. 1). In many places the pulp appears normal; however, in general it is apparent that the reticulum is considerably increased. Now and then are to be found areas of marked sclerosis containing lymphoidal cells in the meshes of the fibrous tissue (see Fig. 2). Nowhere in the spleen are signs of acute inflammation

FIG. 1.



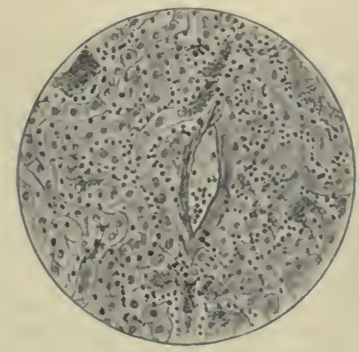
a. Connective tissue invading pulp. *b.* Group of lymphoidal cells surrounded by connective tissue. *c.* Splenic vein.

FIG. 2.



Splenic pulp, showing area in which the reticulum is fibrous. *a.* Lymphoidal cells.

FIG. 3.



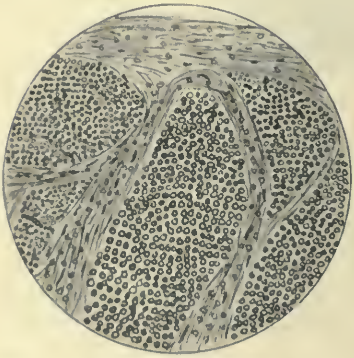
Liver.

or marked degeneration of cells to be found. Section through the infarcts in the spleen shows nothing more than is usually found.

Liver: The liver shows a very slight increase in the interlobular connective tissue, with marked infiltration of lymphoidal elements between the lobules and liver cells (see Fig. 3). The cellular infiltration resembles somewhat that found in leukæmia. Considerable granular pigment is present.

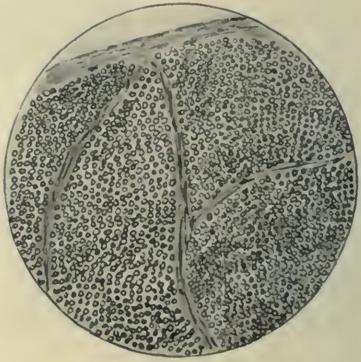
Lymph-glands: The slightly enlarged retroperitoneal, mesenteric, inguinal, and axillary glands present hyperplasia of both connective tissue and lymphoidal elements. The connective tissue, however, shows the greater increase. Fibrous bands surround lymphoidal areas, and the lymph-cells are separated by a visible reticulum. The inguinal glands show much more connective tissue increase than any of the others. They present a condition of real fibrous hyperplasia (see Fig. 4). The retroperitoneal, mesenteric, and axillary glands are practically alike in their histology. The hyperplasia of the connective tissue is not nearly as marked as in the inguinal glands (see Fig. 5).

FIG. 4.



Fibrous hyperplasia of inguinal gland.

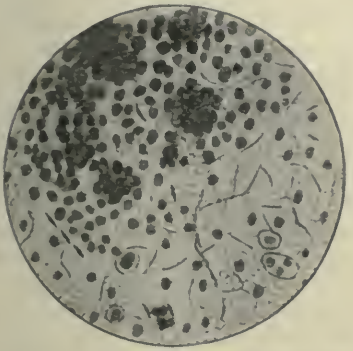
FIG. 5.



Retroperitoneal lymph gland.

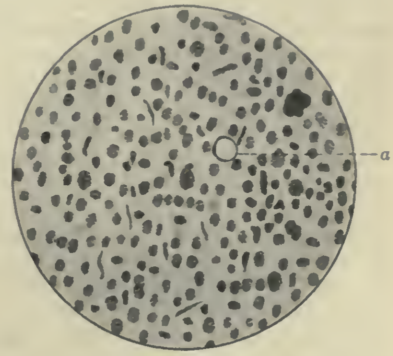
Bone-marrow: The medulla of the femur, which was similar in macroscopical appearance to that found in the other bones, is made up of lymphoidal cells arranged in groups or singly, contained in a fine network of connective tissue. Here and there were areas in which capillary spaces containing blood-corpuscles predominated, with an occasional lymphoidal cell contained within the fine network of connective tissue and capillary walls (see Fig. 6). Ehrlich's stain reveals nucleated red blood-corpuscles. The lymphoidal area found in the femur, previously described in its macroscopical appearance, is made up of lymphoidal cells arranged either singly or in groups, surrounded by a reticulum of finely fibrillated connective tissue, much greater in amount than in the medulla. Bloodvessels with distinct walls permeated the structure, but no aggregation of capillaries such as is described in the medullary tissue is to be found (see Fig. 7). The polypoid growth in the stomach showed a proliferation of the normal glandular structure, containing in it areas of round-cell infiltration. Projecting into the centre of its growth is fibrous tissue, rich in bloodvessels. The small tumor in the thorax is made up of fibrous tissue, which contains within its meshes lymphoidal cells. The heart muscle shows slight granular degeneration. Lungs negative; parotid gland, adrenals, and pancreas negative.

FIG. 6.



Bone marrow of femur, showing fetal condition.

FIG. 7.



Lymphoidal area in medulla of femur.
a. Bloodvessel.

Experimental Research. It is believed by many investigators that both leukæmia and pseudoleukæmia are due to some form of infection. The nature of the infection is not always specified. Some regard the infective agent as a micro-organism. According to Grawitz, twenty-nine cases of pseudoleukæmia have been reported in which bacteria have been found in the swollen glands. Recently Delbet claims to have cultivated a bacillus from the spleen in a case of pseudoleukæmia, and that inoculation of dogs with this micro-organism resulted in the production of glandular swelling. For reasons stated in the section on a theory regarding the origin and nature of pseudoleukæmia, it seems probable that the disorder is located primarily in the spleen, and that the anæmia and cachexia are in some way secondary to the splenic affection.

Ante-mortem Research. With a view of determining, if possible, whether micro-organisms or other toxic agents were present in the spleen, on July 16th, after most careful preparation, 10 c.c. of blood was aspirated from that organ. Tubes containing the following media were inoculated: Glucose and lactose bouillon, milk, human blood-serum, Loeffler blood-serum, glycerin agar, nutrient agar, and gelatin. The spleens of a guinea-pig and rabbit were inoculated through a laparotomy incision. The tubes remained sterile, with the exception of the one containing human blood-serum. Upon this a coccus developed, which proved to be the staphylococcus pyogenes aureus. On the third day after inoculation the guinea-pig showed a portion of gut protruding from the anus, which became gangrenous, resulting in death in three days. The organs were sterile and the histology of the spleen normal. August 3d the rabbit died, and autopsy by Dr. H. G. Wells showed the stomach enormously distended with food, and signs of hemorrhagic gastritis. Spleen and liver normal in size; other organs negative. Histology of spleen and liver negative.

Post-mortem Research. (Autopsy three hours after death.) The same kind of culture media was used as in the ante-mortem experiment.

The tubes were inoculated from the spleen, liver, bone-marrow, and blood from the heart. On an agar tube inoculated from the spleen a bacillus developed which subsequently satisfied the requirements of the bacterium coli commune. Ordinary staphylococci developed on a tube of blood-serum. Another blood-serum tube, inoculated from the liver, developed the bacterium coli commune. All other tubes were negative. An emulsion was made by macerating a small portion of the spleen in about four times the quantity (by weight) of sterilized water. The emulsion was carefully filtered, and three full-grown rabbits and two guinea-pigs were inoculated with the filtrate. The veins of the ears of two of the rabbits were injected, each with 2 c.c. of this extract. Both rabbits died during the following night. Cultures from the heart-blood were negative. The intravenous injection of mice with the blood of the rabbits proved negative. Autopsy on rabbits showed no apparent cause of death. The histological examination of the lungs, spleen, and liver of both rabbits was negative. Five c.c. of the same filtrate was injected into the peritoneal cavity of a guinea-pig, which lived until September 12th. During the last two weeks the animal showed signs of emaciation. Unfortunately, the autopsy was not held until twelve hours after death. The bacterium coli was found in the heart-blood. The peritoneum and organs showed neither macroscopical nor microscopical change. The spleens of a guinea-pig and a rabbit were inoculated with a portion of the same filtrate, with negative results.

Conclusions. The staphylococcus found in the experiment performed ante-mortem may have been located in the skin. The staphylococcus derived from the spleen from the inoculation made post-mortem may readily be explained by the fact that just previous to death a suppurating wound was present in the parotid region. The presence of the colon bacillus in the spleen and liver after death from marasmus is not surprising. The cultivation of the colon bacillus from the blood of the heart of the guinea-pig twelve hours after death is irrelative. No micro-organisms were found in the microscopical section of the tissue of the spleen or any other organ. The inoculation experiments performed both ante-mortem and post-mortem were negative as regards the finding of a specific micro-organism. The death of the two rabbits so soon after the intravenous injection of an aqueous extract of the spleen renders it very probable that an abnormal toxic substance of some nature was present in the organ. Whether that toxic substance had been produced throughout the course of the disease, and whether it was responsible for the anæmia and general malnutrition in the disease, is, in the light of our present knowledge, mere speculation.

THEORY REGARDING THE ORIGIN AND NATURE OF THE DISEASE. Although disorders of the spleen have been studied by the medical profession from the time of remote antiquity, our knowledge of the origin and nature of a number of types of disease associated with splenic enlargement is still very indefinite. Splenic pseudoleukæmia shares in the general obscurity which surrounds the forms of disease closely allied to it—namely, leukæmia and the other varieties of pseudoleukæmia. The number of cases thus far accurately observed has been so limited that one has less than is to be desired upon which to base conclusions.

Hypertrophy of the spleen and progressive anæmia are the most prominent features of the disease. The constitutional symptoms and course of the affection may be satisfactorily explained by the progressive alterations in the blood. Whether other factors, aside from complications, contribute to the fatal termination, our present knowledge will not permit us to affirm or deny. It is rational to presume that the two principal features of the disease—progressive anæmia and enlargement of the spleen—are either directly dependent on each other or that both are manifestations of a common cause. A study of the origin and nature of pseudoleukæmia involves a consideration of the following questions: 1. Is the hypertrophy of the spleen a result of the progressive anæmia, and, if so, upon what does the anæmia depend? 2. Do the chief features of the disease—progressive anæmia and splenic hypertrophy—arise from a common cause? 3. Is the progressive anæmia and general malnutrition due primarily to the pathological changes in the spleen, and, if so, what induces those changes?

Let us first discuss whether it is probable that the splenic hypertrophy is due primarily to the alterations in the blood. If this be true the cause of the anæmia is not apparent, and the disease must be classed as an essential anæmia. In chlorosis the spleen is not infrequently palpable. Among fifty-six cases of undoubted chlorosis, Chvostek was able to palpate the spleen on deep inspiration in thirteen cases. In primary progressive pernicious anæmia the spleen may be enlarged sufficiently to be palpated. However, in both forms of essential anæmia splenic enlargement, when present, is always moderate, seldom reaching more than a finger's-breadth below the costal arch. It fluctuates in size during the course of the disease, and never reaches the enormous tumefaction often found in splenic pseudoleukæmia. A very slight enlargement of the spleen has also been observed in secondary anæmia and in anæmia artifically produced, both in man and in the lower animals. But in the forms of anæmia just described the spleen is often normal in size and at times atrophied. Mosler, Gast, and others regard the moderate enlargement of the spleen which is present in anæmia as a compensatory process. On the other hand, Immerman, Eichhorst, Müller, Neuman and others do not believe that in the conditions enumerated the spleen reverts to its embryonal blood-producing function. Others believe the enlargement due to an increased destruction of red blood-corpuscles. From all available evidence it would appear that while anæmia may give rise to an enlargement of the spleen, its size is always moderate and never approaches the enormous hypertrophy commonly recorded in splenic pseudoleukæmia. Still greater evidence against the theory that the splenomegalia in this disease is due to anæmia is afforded by the fact that in all cases thus far reported splenic hypertrophy preceded the anæmia, and in some cases for a period of a year. From the foregoing it is very improbable that the enlargement of the spleen in splenic pseudoleukæmia is a consequence of the progressive anæmia.

The second question, as to whether the chief features of the disease —progressive anæmia and splenic hypertrophy—arise from a common cause, is extremely difficult to discuss. It is possible that the true solution of the problem lies in that direction. However, in the absence of all direct and indirect evidence favoring that interpretation, it will not be profitable to enter into a discussion of possibilities. On the other hand, the theory which makes the enlargement of the spleen primary, and the progressive anæmia secondary, to the splenopathy has very much in its support. In the cases thus far reported, splenic hypertrophy has preceded the anæmia and other constitutional symptoms of the disease. We must next consider whether the pathological changes which occur in the spleen are capable of inducing the profound alterations in the blood and general nutrition which accompany the disease. Accurate knowledge of the function of the spleen would be of inestimable value in the solution of the problem. Unfortunately, very little is known regarding its function. An extended discussion of the various theories regarding it is beyond the province of this paper. The following are some of the more prominent advocated: 1. During fœtal life and shortly after birth, in man, the spleen is supposed to produce red blood-corpuscles. In some animals this function is retained during life. There is no positive evidence that this obtains in the adult life of man. 2. It is believed, on rather unsatisfactory evidence, that the spleen is engaged in the destruction of red blood-corpuscles. 3. White blood-corpuscles, chiefly of the large mononuclear variety, are probably formed in the spleen. 4. The theory of Schiff and Herzen, that the spleen produces a substance (an enzyme) which, being carried by the blood to the pancreas, acts upon the trypsinogen contained in the gland, converting it into trypsin, has not been confirmed by other investigators. While there is very little positive evidence as to the exact function of the spleen, it is generally conceded that the organ in some way exerts an influence on the constituents of the blood. That the spleen is not necessary to life has been demonstrated repeatedly by its entire removal. However, this does not prove that it is functionless, since vicarious organs may perform its work. It is interesting to note that in a few instances, after removal of the organ, the lymph-glands have shown a moderate increase in size. Since the removal of the spleen is not incompatible with perfect health, it is not reasonable to presume that the malignant course of splenic pseudoleukæmia is due to suspension of the normal function of the gland in consequence of its hypertrophy. On the other hand, it cannot be denied that the pathological changes in the spleen may alter its function in such a way as to result in grave disturbances of nutrition. If the spleen is normally engaged in the destruction of red blood-corpuscles, possibly an abnormally great destruction of these elements takes place as a result of splenic hyperplasia. It is claimed by a number of investigators that the blood in the splenic vein normally shows a marked difference in its constituents from that contained in the splenic artery. The results obtained have varied so greatly that one is unable to draw specific conclusions. They render it very probable, however, that the normal spleen is actually engaged in metabolic processes. The complex chemical composition of the spleen, and especially the presence in its tissue of a number of nitrogenous extractives, such as xanthin, hypoxanthin, adenin, and uric acid, strongly favors that conclusion. Aside from these substances, the tissue of the spleen contains inosite, tyrosin, leucin, formic, lactic, and butyric acids, and cholesterine. Its chief mineral constituent is an organic compound of iron. Possibly chemical agents are elaborated by the diseased spleen, which, either in the gland or after they gain access to the circulating blood, inhibit the production of red blood-corpuscles or cause their dissolution, and thus induce anæmia. An analogous theory explains the anæmia of exophthalmic goitre, on the grounds that an enlarged thyroid produces toxins capable of causing dissolution of red blood-corpuscles. That a toxic substance of some nature was present in the tissues of the spleen in my case is probable from the evidence obtained by injecting the veins of rabbits with a few cubic centimetres of the filtrate of an emulsion of a small portion of the spleen. The animals died within a few hours, and no adequate cause for death was present at post-mortem. Whether this toxic substance was capable of destroying the red blood-corpuscles was not determined by the experiment. The blood of the rabbits showed no apparent histological changes in the several slides examined. There is nothing in the histology of the spleen in splenic pseudoleukæmia which would favor the theory that the anæmia was secondary to the splenic hypertrophy. The histological changes constitute a true hyperplasia, and present nothing which differentiates it essentially from other forms of splenic hypertrophy that are not accompanied by progressive anæmia. The greatest evidence, however, in favor of primary splenopathy, in splenic pseudoleukæmia, is afforded by the results of total extirpation of the hypertrophied organ. Even after hemorrhages, œdema, and signs of cachexia were well developed removal of the hypertrophied spleen has resulted in recovery (see résumé below). The fact that complete recovery took place after the removal of the hypertrophied spleen in five cases of splenic pseudoleukæmia points directly to the spleen as the source of the anæmia.

TREATMENT. The treatment of splenic pseudoleukæmia is medicinal and surgical. The indications to be met in medicinal treatment are to build up the blood and general nutrition. Iron, arsenic, and other drugs having a similar therapeutic influence should be administered. Rest in bed should be enjoined, and constipation, if present, relieved. Special symptoms, as nausea, vomiting, diarrhœa, and pain, require the same treatment as when due to other causes. In the later stages diarrhœa may be so persistent as to require great care in its treatment. The disease is modified only temporarily by internal modification.

Surgical Treatment. If the disease is primarily located in the spleen, and the pernicious course of the affection is due to the effect of the pathological changes in that organ upon the blood and general nutrition, it would be a rational procedure to remove the spleen as soon as the diagnosis is positive and when no special contraindication is present The number of splenectomies performed in which this disease was undoubtedly present is very small. In reviewing the literature of splenectomy it is exceedingly difficult in many cases to determine the nature of the disease for which the operation was performed. As a rule, the operator has been more concerned in the technique of his operation than with the nature of the pathological process for which it was performed. The justification of that statement is furnished by the fact that in the total number of cases (about 190) in which the spleen has been removed a microscopical examination of the blood has been recorded in less than twenty cases, and in some of these only imperfectly. Since a blood examination is necessary to the diagnosis of splenic pseudoleukæmia, it would be futile to search for cases of that disease among the affections in which splenectomy has been performed outside of the limited number in which the blood has been examined. I will give a short résumé of the cases in which splenectomy has been performed, where it seems probable that the disease present was splenic pseudoleukæmia:

Case I.—Operator, Spencer Wells; date, 1865. Female, aged thirty-four years. Symptoms: Marked anæmia, slight increase in the white blood-corpuscles (character of corpuscles not noted). Weight of spleen, 2672 grammes. Result, death.

Case II.—Operator, Péan; date, 1876. Female, aged twenty-four years. Patient never had malaria nor any serious illness. Eighteen months before operation a splenic tumor appeared. Six months previous to operation signs of anæmia present; subsequently anæmia gradually progressed. Digestion greatly disturbed, violent neuralgic pains, hæmoptysis, hæmatemesis, hæmaturia, and bloody stools were recorded; no leucocytosis. Weight of spleen, 1125 grammes. Result, in one month patient had recovered perfectly; subsequently died of toxic enteritis.

Case III.—Operator, Czerny; date, 1878. Female, aged thirty years. No history of malaria. Spleen large and movable; no leucocytosis; general health very poor; digestion disturbed; signs of anæmia; disturbed menstruation; weight of spleen not given; size, 23 x 12 x 8 cm. Result, complete cure.

Case IV.—Operator, Franzolini; date, 1881. Female, aged twenty-two years. Never in good health; at twelve years of age she suffered from œdema and ascites, from which she recovered. Menstruated at seventeen, but always irregularly; was subject to hysteria; never had malaria. About two years previous to operation the patient noticed constant pain in the left hypochondriac region. Pain was increased on pressure and in the erect position. Patient grew weak, and when admitted to the hospital a tumor was readily detected in the left hypochondriac region, which proved to be a hypertrophied spleen. Sufferings of the patient and signs of anæmia increased. Skin and mucous membrane were very pale; great muscular fatigue; vomiting obstinate; panniculus adiposus greatly reduced. Leucocytes: Five times the normal number were present. Weight of spleen, 1526 grammes. Result, complete cure. All suffering ceased and the oligæmia disappeared. Thirty-six days after operation the white corpuscles were reduced to one-half the number present at the time of the operation. This case was reported as a leukæmia, and is usually so regarded. The method employed to estimate the leucocytosis was subject to inaccuracies. An increase of leucocytes to five times the normal number is not sufficient evidence for the diagnosis of a leukæmia unless the quality of leucocytosis was that which is peculiar to leukæmia. Banti is also of the opinion that this case was not a leukæmia.

Case V.—Operator, Frascani. Female, aged sixteen years. No hereditary influence; never had malaria or syphilis; had noticed a large tumor in the left half of the abdomen for two years. During this time epistaxis, fever, and diarrhœa were now and then present. Mucous membranes pale. Signs of anæmia began one year before the operation, and were marked at the time of operation; œdema and ascites present. Blood examination: Red blood-corpuscles, 3,900,000; white blood-corpuscles, 7030 per cubic centimetre; hæmoglobin, 68 per cent. External lymph-glands slightly enlarged. Result, death in four hours from hemorrhage. Weight of spleen, 1310 grammes. Weight of liver, 1050 grammes.

Case VI.—Operator, Ceci; date, 1893. Female, aged thirteen years. Disease began two years previously; signs of anæmia and tendency to hemorrhage from the gums; bones normal; muscles weak; adipose tissue thin; abdominal tumor firm and smooth. Blood examination: Red blood-corpuscles, 3,592,000; white blood-corpuscles, 15,000 per cubic centimetre; hæmoglobin, 65 per cent. Weight of spleen, 1300 grammes. The quality of leucocytosis not recorded. Result, recovery.

Case VII.—Operator, Lindfors; date, 1892. Female, aged twenty years; constitution weak. Five years previous noted tumor in the left side of the abdomen; signs of anæmia were present. The red blood-corpuscles were diminished and the hæmoglobin was especially reduced in quantity; the relation of the white to the red blood-corpuscles was 1 to 250. No thyroid or lymphatic enlargements. Size of the spleen, 25 x 15 x 7 cm. Result, recovery.

In all I find seven splenectomies in which the records are sufficiently explicit to justify a very probable diagnosis of splenic pseudoleukæmia. There are other cases that appear to belong to the same type of disease, but, owing to the meagreness of the records, I have not felt justified in including them. Five among seven cases in which it is reasonably certain that splenic pseudoleukæmia was present were cured by a removal of the hypertrophied organ. The remaining two died of hemorrhage. In not one of the seven cases was operation performed early in the course of the disease. In at least two of the five cases that recovered the disease had advanced well into the cachectic stage. When we consider that splenic pseudoleukæmia is a progressive disease, which, so far as has been recorded, invariably terminates fatally when treated medicinally, it is apparent from the statistics that splenectomy should be performed as soon as the diagnosis is positive and the case not too far advanced to preclude possibility of recovery. As a rule, in splenectomy the mortality increases with the size of the spleen. In none of the cases, however, in which recovery took place was the spleen less than five times the normal size. In one case, which resulted in cure, the hypertrophied organ was nearly eight times as large as normal, and the cachexia was extreme. The mortality after operation in this disease is very much less than when leukæmia is present. Douglas reported thirty-six cases of splenectomy for leukæmia, with only five recoveries, and three of these I have included as cases of splenic pseudoleukæmia.

PERFORATION OF THE STOMACH IN AN INFANT SEVEN WEEKS OLD.

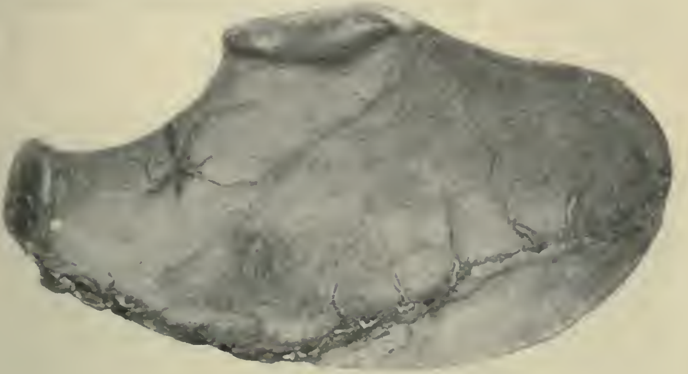
By T. M. Rotch, M.D.,
PROFESSOR OF DISEASES OF CHILDREN, MEDICAL SCHOOL OF HARVARD UNIVERSITY, BOSTON.

The following case is reported as unusual and of especial interest from a pathological stand-point:

A male infant, aged seven weeks, was admitted to the Infants' Hospital, February 2, 1899. The history given at the time of entrance was that the infant had been well until four days previously, when his abdomen became suddenly much distended and he appeared to suffer considerable pain. After the first twenty-four hours the bowels had moved regularly and the pain had lessened. Vomiting had begun about eight hours before entering the hospital.

An examination by Dr. Dane, the surgeon-in-charge, and by Dr. Morse showed a well-developed and fairly-nourished infant. The facial expression was rather drawn, the eyes dull, and the abdomen much distended and tympanitic, excepting that there were very slight areas of dulness in both inguinal regions. A few coils of distended intestine could be detected. The pulse was 165, the temperature 101° F., and the respirations 35. The diagnosis of peritonitis was made, and it was decided to operate at once. Ether was given, and an incision four inches long was made in the median line, and about 2 drachms of slightly flaky serum exuded. The vessels of the much-distended small intestine, and especially of the mesentery, were found to be very much injected. A few flakes of lymph were found adhering to the intestines. The intestine was thoroughly examined, practically through its whole extent, without any cause for the peritonitis being discovered. The abdominal cavity was irrigated and the wound closed. Three days later the infant died.

FIG. 1.

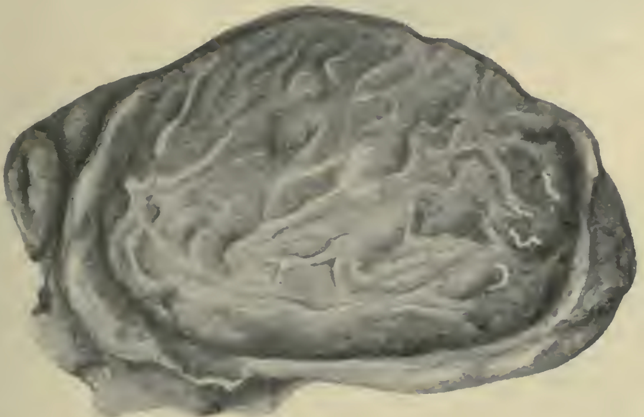


Normal size.

Eighteen hours after death the autopsy was made by the pathologist to the hospital, Dr. W. F. Whitney, to whom I am indebted for the pathological diagnosis and for the sections of the lesion.

The body was that of a well-developed infant; rigor mortis was present.

FIG. 2.



Normal size.

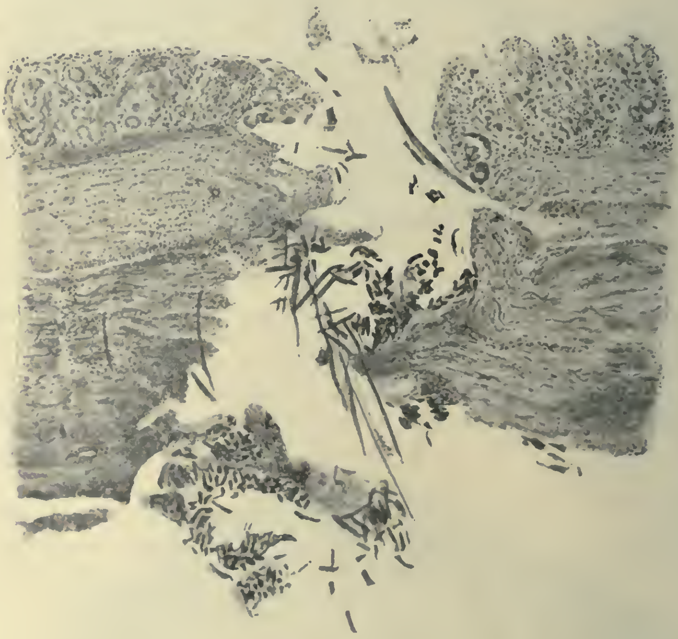
There was an incised wound about 6 cm. long in the median line of the abdomen just below the umbilicus. This was partly closed at the ends by interrupted sutures, while from the middle projected a wick of gauze. This reached well down to the root of the mesentery, and was surrounded by coils of intestine, which were glued to the abdominal wall and to each other. There was no free fluid in the pocket drained by the wick. The adhesions between the coils of intestine could be easily separated, and lying between them was a little opaque, turbid serum in which were occasional flakes of lymph.

The head was not opened.

The lungs were of normal color, well retracted, with a few dark, slightly depressed areas. The pleural surface was smooth and the cavities normal.

The heart was normal and weighed 65 grammes.

FIG. 3.



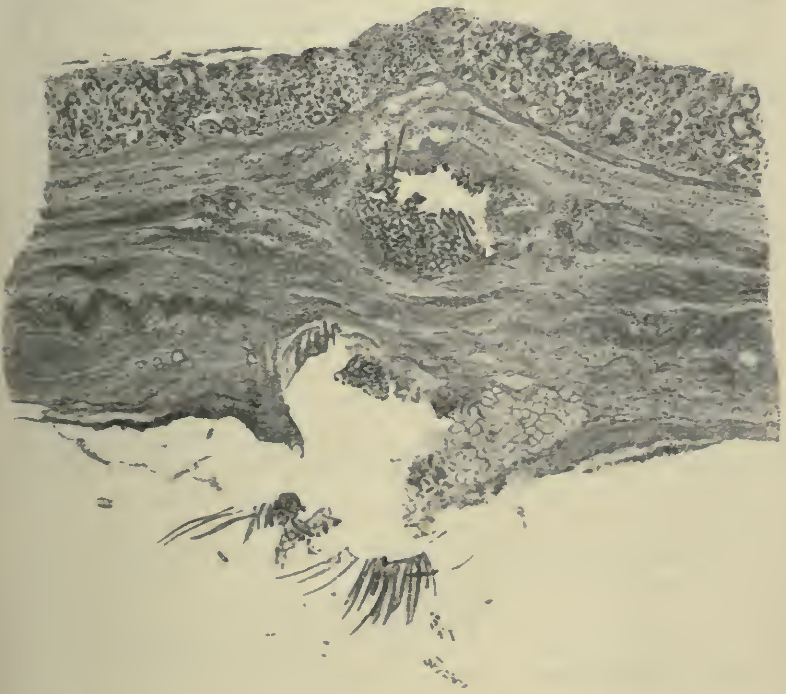
The condition of the lower part of the peritoneal cavity has been previously described. The stomach was quite extensively adherent to the diaphragm along its anterior surface, and on carefully separating the fibrinous adhesions one point was noticed where the exudation was a little thicker and more adherent. Embedded in this, and apparently coming from the wall of the stomach, was a minute thread about 2 or 3 mm. in length. There was also a little more injection than elsewhere in the immediate vicinity of this spot.

On opening the stomach it was found to be generally normal, with the exception of a minute loss of substance surrounded by a reddened zone opposite the place of greatest exudation on the outside.

This portion of the wall of the stomach was cut out, and after hardening in Zenker's fluid was mounted in paraffin and a series of sections cut. As the result of the studies of these it appeared that there was an oblique passage from within outward through the entire thickness of the wall, and in it lay a foreign body. This was made up of a bundle of very small, irregularly rounded, structureless fibres, staining intensely with aniline dyes, but not with hæmatoxylin.

The edges of the mucosa were slightly rounded over from within outward, as if the original lesion had been in that direction. The cavity in the middle of the coat was partly filled with leucocytes and round cells surrounding the fibres, but not infiltrating among them, and nowhere did the foreign body project into the interior of the stomach.

FIG. 4.



After staining by Gram's method, large numbers of small rod and spherical bacteria were found on the peritoneal surface close to the thread. No cultures were taken at the autopsy, on account of the lapse of time after death.

The liver was normal in appearance and weighed 165 grammes.

The kidneys were pale and together weighed 35 grammes.

The spleen was dark red and weighed 15 grammes.

The pancreas, adrenals, and the genital organs presented nothing remarkable.

The chief interest in the case centres in the perforation and its cause. That the general peritonitis had started from this point there was little doubt, as the evidences of the inflammation were most extensive here and the exudation thicker and firmer. It is highly improbable that this could have been anything introduced at the time of the operation, for to have produced the lesions would have required several days, as shown by the thinned and somewhat everted mucosa. How the perforation took place from the inside is also hard to understand if this foreign body is nothing but a bit of silk thread, as its structure would indicate. It is suggested that possibly a threaded needle was swallowed, and had perforated, leaving a bit of silk behind, and the needle was overlooked among the coils of intestines. It certainly was not thought of at the time of the autopsy, and no especial search was made for it. Another suggestion is that it was a case of follicular ulceration, and the bit of thread had worked its way into that. But the loss of substance in the mucosa is rather less in extent than deeper in, and there is no evidence of any inflammation in the neighborhood that would warrant the assumption of such a process.

We are left, therefore, with the simple fact that the local lesions are all in the immediate neighborhood of the foreign body, and that the perforation and the secondary fatal peritonitis must be referred to it.

The appearances to the eye and under the microscope are well shown in the accompanying drawings made by Miss Byrnes.

A CRITICAL SUMMARY OF RECENT LITERATURE

CONCERNING

SOME RECENTLY DESCRIBED REFLEXES.

By Joseph Sailer, M.D.,
ASSOCIATE OF THE WILLIAM PEPPER LABORATORY OF CLINICAL MEDICINE.

Since the original discovery by Westphal, in 1875, that a blow upon the patellar tendon caused a contraction in the quadriceps extensor of the thigh, the subject of tendon and other reflexes has received an enormous amount of consideration, but even in this long period all the possible simple reflexes, so called, have not been recognized and described, or, at least, it would seem not, for nearly every year a new one is discovered or one that was forgotten resurrected. Among the most recent may be mentioned the *hypothenar* reflex. This was apparently first recognized by Stembo[1] in 1894, who noted that pressure upon the pisiform bone caused the appearance of a fold upon the ulnar side of the hand. He ascribed this to the contraction of certain small bundles of muscle fibres that arise from the edge of the palmar aponeurosis (the palmaris brevis). The reflex also involves the fixation of the palmar aponeurosis by the palmaris longus, otherwise, of course, the muscles could not produce a fold by their contraction. This article apparently excited very little interest, and it was not until four years later that Holtzinger[1] rediscovered it, apparently in ignorance of Stembo's work. He described the fold upon the ulnar surface of the hand, which, according to him, varies considerably in different people, being sometimes straight, sometimes arched, and agrees that it is produced by the contraction of the palmaris brevis. This contraction, he notes, is not the mere transient twitch such as occurs in tendon and periosteal reflexes, but is tetanic in character, lasting as long as pressure is continued, and varying directly with it in intensity. He also states that various paræsthetic sensations are occasionally perceived on the ulnar side of the hand. If the irritation is continued for some time the contraction becomes intermittent—that is to say, there are a series of twitches. The reflex is usually best elicited by pressure upon the pisiform bone, but may also be caused by pressure upon the flexor tendon in the hand, by pressure upon the end of the little finger, and by passive abduction of the little finger. It is not produced, however, by mere cutaneous irritation. Holtzinger, therefore, concludes that this is not a cutaneous but rather a tendon reflex. It differs from other tendon reflexes in part by the fact that it is produced when the muscle is slightly relaxed, and in part by the fact that the contraction is tetanic and not clonic in character. Neither Stembo nor Holtzinger claim that it is of any pathological significance. In a number of cases in which I have tested this reflex upon normal and pathological cases I was unable to determine that it occurred in connection with any particular condition. In three cases of hemiplegia it occurred distinctly in one and not in the other two on the paralyzed side. In one case of hysteria and in one of neurasthenia it was quite distinct. It does not seem to occur more readily, however, in cases in which the tendon reflexes are exaggerated. Although I have no notes of my observations, it seems to be present in about half of all normal persons. It is possible that more extensive investigations in functional cases of nervous disease will indicate that it bears some relation to them. I have also observed that instead of a single fold there are usually several that pass obliquely along the ulnar side of the hand, corresponding to the structure of the muscle.

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[1] Berlin. klin. Woch., 1894, No. 15.

The new reflex for the year 1898 was the toe reflex described by Babanski.[2] It consisted in the discovery that in certain conditions the toes were extended (flexed dorsally) when the sole of the foot was irritated. It has been known for a long time that the retraction of the foot upon irritation of the sole—that is, the ordinary plantar reflex—was associated with plantar flexion of the toes. Babanski claimed that in disease of the pyramidal tracts irritation of the skin on the anterior portion of the sole, as by a needle prick, produced exactly the opposite effect—that is to say, the toes were extended—this movement being especially distinct in the great toe. He found this reflex in hemiplegia, in meningo-encephalitis, in epilepsy, transverse myelitis, and syringomyelia. It did not occcur in neuroses nor in cases of peripheral neuritis, myelitis, nor in tabes dorsalis. Occasionally it was present in cases where the reflexes were greatly exaggerated. He also makes the interesting observation that it is ordinarily present in infancy, and contends that this supports his view regarding its relation to the pyramidal tract. In a later publication[1] he mentions that he observed the phenomenon in three cases of organic paraplegia, in one case of spinal hemiplegia, and in one case of tabes dorsalis with meningo-encephalitis. He reiterates that it is an indication of lesion of the pyramidal tract, and believes that it is particularly valuable in distinguishing hysterical from organic hemiplegia.

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[1] Neurologisches Centralblatt, 1898, No. 19.

[2] Progrès Médicale, 1898, p. 166.

Cohn,[2] who had seen Babanski's article, and was astonished by his claim that the toe reflex was one of the earliest symptoms, if not the earliest symptom of lesion of the pyramidal tract, undertook some extensive observations concerning its occurrence. He calls attention to the fact that nearly all cutaneous reflexes are characterized by a movement of flexion, and accepts Gad's explanation that this is on account of the greater susceptibility of the flexor centres. He found that in about 60 per cent. of all cases irritation of the sole of the foot produced flexion, in about 20 per cent. extension, in about 10 per cent. no movement occurred, and in 10 per cent. the results were doubtful. Usually extension was restricted to the great toe. In children he concluded that no toe reflex at all occurred. In pathological cases he found extension in a number of cases in which the pyramidal tract was involved, but it did not occur in any cases of tabes dorsalis nor of polyneuritis. In cases of meningitis there was prompt flexion, and in one case of hysterical monoplegia there was extension of the toes. In neurasthenia no reflex occurred in about 40 per cent. of the cases. Cohn argues that if we accept Jendrássik's explanation of the cutaneous reflexes, that they have a longer or more complicated arc than is required for the tendon reflexes, we should expect, in disease of the pyramidal columns, a weakening rather than an exaggeration of the movement. It may be possible, however, to assume that weakening of the flexors or the removal of inhibition from the extensor centres actually does occur. He concludes, therefore, that Babanski's toe reflex, although commonly occurring in cases of organic disease of the pyramidal columns, is not pathognomonic.

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[1] La Semaine Méd., 1898, No. 40.

[2] Neurologisches Central., 1899, No. 13.

Schuler,[1] in view of the contradictory conclusions reached by Cohn and Babanski, undertook to test the subject thoroughly. He classifies his results according to the sexes. In men he found that in 80 per cent. of the cases there was flexion, in 6 per cent. extension of the great toe, in 2 per cent. extension of all the toes, and in 10 per cent. no reflex whatever; in 2 per cent. the results were doubtful. In women the results were practically the same, with the exception that extension occurred in only 4 per cent. of the cases examined, and an indefinite reflex in 6 per cent. In children flexion occurred in 30 per cent., extension in 12 per cent., indefinite reflex in 18 per cent., and no reflex whatever in 40 per cent. This 40 per cent. was made up especially of children less than one year of age, and seems to contradict Babanski's contention that in young children dorsal extension occurs. His general results seemed to be, however, more in accordance with Babinski than with Cohn. In pathological cases the reflex was absent; in hysteria and tabes it was present in all cases with disease of the pyramidal tracts, and could be elicited by the slightest irritation. Schuler does not believe with Geigel and Cohn that this reflex depends upon alteration in the sensory conducting apparatus, for in six of his cases sensation was absolutely normal, and he concludes, therefore, that in difficult cases the toe reflex may be of value in discriminating between organic and functional disease. Personally, I have observed this reflex in one case of hemiplegia; in about forty other cases of various conditions, including neuroses with exaggerated reflexes, either flexion or no reflex occurred.

The pupillary reflexes have received a good deal of attention in the last year, and two forms that had been incompletely described, but were by no means generally known, have been investigated and analyzed. These are contraction associated with closure or attempted closure of the eye, described by Westphal and Piltz, and the so-called cortical or attention reflex (Aufmerksamkeits reflex), to which the latter has devoted two articles. Westphal[2] was led to investigate the eyelid phenomenon in Mendel's clinic by the discovery that the immobile and dilated pupils of a case of general paresis were strongly contracted when the patient made an effort to close the eyes against resistance. As a result of this he made a systematic examination of a great number of cases, in which the pupil did not react to light, and found that the phenomenon was practically constant. In order to determine whether this was not a very common associated movement, a number of healthy persons and a number of persons suffering from functional nervous diseases with normally reacting pupils were also tested, and only in one case of hysteria was the symptom present. It is difficult to decide just what this pupillary reaction means. The fact that when the attempt is made to close the eye the eyeball rolls up and outward excludes the possibility of the influence of convergence or accommodation, and the latter is also rendered unlikely by the fact that in many of those eyes in which it appeared, reaction to accommodation is not present. Neither does it seem likely that alterations in the blood pressure are of any significance, for direct pressure upon the cornea does not cause the pupil to contract. Westphal, therefore, is compelled to believe with Bernhardt, that our knowledge of the association of the various nerve-tracts in the central nervous system is not sufficient to explain these various combined movements, but suggests the possibility that there is some connection between the cells of the facial nucleus that innervate the orbicularis oculi and those of the oculomotor nucleus that cause contraction of the iris.

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[1] Neurologisches Central., 1899, No. 13.

[2] Ibid., 1899, No. 4.

One month later Piltz[1] published a paper, decorated with a long series of dates, with the object of showing that he had discovered this pupillary reflex some time before Westphal's publication. He first discovered it in the eyes of a case of general paresis with immobile pupils. When this patient was urged to close his eyes and then open them it was found that both pupils were in a state of marked contraction that lasted for an appreciable interval of time. When the same patient was directed to attempt to close the eyes against resistance, at the same time fixing some object, the pupils contracted still more vigorously. The application of homatropine, causing dilatation, or of eserine, causing contraction of the pupil, made the phenomenon disappear. As a result of this case Piltz made extensive investigations into the subject, testing the eyes of cases of general paresis, katatony, epilepsy, tabes dorsalis, blindness, and twenty-three healthy persons. He found the first reflex —that is, contraction of the pupils—after simple closure of the eyes, twenty-five times; nine of these patients had complete failure of reaction to light, ten had a slight reaction to light, and five a good reaction to light. It therefore follows that this reaction occurs chiefly in cases of interference with the light reflex, but not exclusively. The second reflex, simple narrowing of the pupils during an attempt to close the eyelids against resistance, occurred in forty-two of his series of cases; eleven of these had failure of reaction to light, twelve had slowly reacting pupils, and seventeen promptly reacting pupils. One case of general paresis with moderately dilated pupils that had failed to react to light did not present the symptom. In one case of locomotor ataxia, blind as a result of optic atrophy, the reflex was consensual. In one case of complete oculomotor paresis with immobile pupils both reactions were present and prompt. Piltz calls attention to the fact that this phenomenon was suggested in Wundt's text-book as early as 1880, and was more completely described by Gifford in 1895, but neither communication appears to have attracted general attention.

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[1] Neurologisches Centralblatt, No. 6.

In a paper published some time later Mingazzini[1] claimed priority of the discovery of this reaction for his colleague Galassi, who observed the reflex in 1887, and called it the eyelid reaction of the pupils. The first patient had immobility of the pupils; when she closed her eyes and then opened them the left pupil was found strongly contracted, and it also contracted when the eyelids were held apart and the patient attempted to close them. In a second case, in which this phenomenon occurred in the right eye, the autopsy revealed a chronic thickening in the extradural portion of the oculomotor nerve, apparently caused by a deformity in the dorsum sellæ and irritation by the right posterior clinoid process. Galassi's theory was that the phenomenon occurred as a result of associated muscular action, and gave the following explanation of its occurrence when the light and accommodation reflexes were lost, admitting that voluntary impulses may be transmitted through a degenerated nerve before merely reflex impulses. He supposes that the vigorous innervation of the orbicularis palpebrum is accompanied by irritation of the pupillary contracting centre in the oculomotor, causing narrowing of the pupil in cases in which, as his autopsy showed, the oculomotor is so degenerated that the ordinary impulses do not pass. In addition, he assumed a degenerated condition of the smooth muscle fibres of the pupillary sphincter, producing in them a state of exaggerated irritability. He was convinced that this probably occurred, and that the condition was progressive, because in the case in which the phenomenon was first observed by him, it diminished markedly in the course of time, probably as a result of further degeneration of the muscle. He also believed that this reaction was found occasionally in normal eyes. I have observed this reflex in a case of general paralysis in which, however, the light reflex was present.

The cortical reflex described by Piltz is interesting, because it proves that the activity of the higher psychical centres has an influence upon the size of the pupil, and may be exerted voluntarily. Of course, it has been known for a long time that in emotional states the pupils commonly dilate. Piltz[2] has shown that for the pupillary reflexes, as well as for the tendon reflexes, there are at least two arcs concerned—

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[1] Neurologisches Centralbl., 1899, No. 11.

[2] Ibid., 1899, No. 1.

an upper and a lower one. The experiments were carried on in a variety of ways. The patient, who was placed in a moderately illuminated room, fixed a point upon the opposite wall, and then had placed at the periphery of the field of vision a bright and a dark object. Without changing the direction of his glance, he turned his attention alternately first to one and then to the other, and the observer noted that the pupils became narrower when the attention was directed to the bright object, and wider when it was directed to the dark object. Piltz then undertook to determine whether the mere imaginary presentation of a light or a dark object could have any influence upon the pupil, and found that when the subject was educated to the point of fixing his attention vigorously upon some such imaginary object the pupil underwent dilatation or contraction, according as the object was dark or light. These changes could not be due to circulatory disturbance, because the artificial production of alterations in the amount of blood in the iris had no effect whatever. In a subsequent paper[1] he repeated the latter series of experiments, and with a well-educated subject the results were invariably the same, and were not influenced by the distance of the fixation point, which varied from 20 cm. to infinity. In order to exclude any possible error, the observer and the subject registered simultaneously upon a moving drum, the former the actual alterations in the size of the pupils, the latter his subjective representations. Haab admits the conclusive nature of the proof of a higher reflex arc—that is, of fibres going from the cortex to the oculomotor nucleus—and Piltz believes that a discovery made a year ago by himself, that there exists in the cortex of the rabbit a centre for the unilateral contralateral contraction of the pupil, indicates the existence of such cortical fibres.

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[1] Neurologisches Centralblatt, 1899, No. 11.

REVIEWS.

LECONS DE CLINIQUE CHIRURGICALE. Traites a L'hotel-Dieu. (LESSONS ON CLINICAL SURGERY.) Par PIERRE DELBET. Paris: G. Steinheil.

THIS volume contains twenty clinical lectures delivered at the Hôtel Dieu, lectures which treat most entertainingly and instructively of a great variety of subjects, and in which these subjects are presented in that clear, precise, and beautiful style which is characteristic of the writers of France. The following subjects are discussed: Uranoplasty, complications of otitis media, congenital thyro-hyoidean cysts, impassable stricture of the œsophagus, the diagnosis of incipient Pott's disease, fracture of the vertebral column, cirsoid aneurism, carpus curvus, retardation of the palmar aponeurosis, part played by valvular insufficiency in the internal saphenous vein in the production of varicose veins of the lower extremity, Dupuytren's fracture, intestinal obstruction produced by twisting of the mesentery, chronic and incomplete intestinal obstruction, treatment of hydatid cysts of the abdomen, appendicitis and salpingitis, and the treatment of appendicitis.

In cleft palate the author is opposed to a very late or a very early operation, and prefers to operate between the sixth and seventh year. He does not approve of the early operation, which is so strongly and to our mind so convincingly advocated by Edmund Owen. Owen maintains that if operation is delayed until the habit of imperfect speech is formed that the closure of the cleft will not correct the speech defect, a view which seems reasonable, to say the least. Delbet opposes operation during the second or third year, maintaining that in these early operations there is a greater mortality, no better, and possibly a worse, phonetic result, such failure being due to the extreme difficulty of operating in the very young, and the liability to subsequent maxillary atrophy. He approves of Le Dentu's dictum, that is, "I admit one could perform urano-staphylorraphy or staphylorraphy upon robust individuals, at a little more tender age than six or seven years, but I would not willingly risk doing it on a person of less than five years, or, at the extreme, four years of age." Delbet operates by the double bridge method of Diefenbach, and exactly follows the technique of Trélat.

In discussing otitis media he offers the following suggestive hint: If an individual, comatose or semi-comatose, is brought into the hospital, if you can obtain no accurate history of the patient, and can extract no information from him, think of the possibility of an auricular origin, and at once examine the ear. If it is of auricular origin you will often find a flow of pus from the ear—often, but not always, because in some cases the flow of pus ceases when the mastoiditis begins. This is because the swelling of the mucous membrane blocks the aditus. Hence, a dry ear does not prove that the origin of the condition is not auditory. In such cases an otoscopical examination should be made, to see if there is a reddened or perforated tympanum. The following physical signs are significant in a comatose patient: Redness of the skin, bulging of the posterior superior wall of the external meatus, œdema of the skin in the retroauricular region. These signs, however, may be absent, and usually are absent in the initial stage. There is one sign which is never absent, and that is tenderness of the mastoid, and, as Schwartze has shown, pressure upon the mastoid may even arouse the patient momentarily from coma. The author discusses the complications of otitis media (brain abscess, Pott's abscess, meningitis, sinus thrombosis, and mastoiditis). In sinus thrombosis he believes in the ligation and division of the jugular vein if it can be carried out below the thrombosis.

In discussing stricture of the œsophagus he reminds us that the swallowing of corrosive fluid, as a rule, produces multiple stricture, and any operative procedure must be founded on this knowledge. He says, as a rule, but not always, a stricture impermeable from above can be passed from below after the performance of gastrotomy. If the patient is much weakened such a complex operation is not justifiable, and gastrostomy is to be preferred. If the œsophagus is opened above a stricture it may be found possible to pass a bougie by this route, although impossible by the mouth. Another method consists in opening the œsophagus above and also below the stricture, inserting a finger into the upper opening and a blunt-pointed bistoury into the lower opening, and dividing the constriction (Gussenbauer's combined œsophagotomies). We would prefer, if it can be used, the string saw of Abbé.

Delbet believes in forcible reduction in Pott's disease. He says there are three methods: (1) The ancient and simple plan of traction, etc.; (2) the bloody method; (3) Sayre's suspension. He considers the first plan the best, and says the hopes of the advocates of laminectomy have not been realized.

He considers that the only real treatment for cirsoid aneurism is extirpation of the tumor. Injections of coagulating fluids is dangerous and ligation of afferent vessels useless.

In carpus curvus the dislocation is secondary, and attempts at reduction are bound to fail. It is necessary to break the curved radius before it can be straightened (osteoclasis or, preferably, osteotomy).

The author believes that retraction of the palmar aponeurosis is due to trophic disturbances. He believes in early treatment, and after operation employs massage and gymnastic exercises. He favors Goyraud's or Busch's operation.

Delbet makes a convincing argument to prove that incompetent valves in the internal saphenous vein cause varicosities in the leg. The incompetence permits increase of tension in the vein, venules, and capillaries when the patient is upright or when he walks. The pressure changes each instant, and at times is equal to or above that in the capillaries. The nutrition of the skin and subcutaneous tissues becomes much impaired. Blood from the saphenous is deviated into the deeper vessels, and reaches the popliteal and femoral veins, and some of this blood flows back into the saphenous from the femoral (vicious circle of Trendelenburg); hence the blood may actually flow in the wrong direction in the saphenous vein.

The author discusses the cause of appendicitis, and maintains that the closure of the lumen at some point is the result rather than the cause of the disease. He points out the chief points in making a diagnosis between appendicitis and salpingitis, and reminds us that both conditions may exist in a woman at the same time. Delbet inveighs against the importance some writers attach to McBurney's point. It is interesting to note that the author does *not* operate upon every case.

In the above remarks we have endeavored to give in a very sketchy manner some of Delbet's views upon various controverted points. These few remarks cannot do justice to this truly excellent book. It is one which all surgeons can read with interest and with profit.

J. C. DA C.

SAUNDERS' MEDICAL HAND ATLASES. DISEASES OF THE SKIN. By PROF. DR. FRANZ MRACEK, of Vienna. Edited by HENRY W. STELWAGON, M.D., Ph.D. Philadelphia: W. B. Saunders, 1899.

To the student or practitioner of medicine who may wish to pursue a course in dermatology, and to whom clinical opportunities are lacking, this little book will be extremely valuable. There are numerous men who may wish to increase their knowledge of cutaneous diseases, but cannot find time to take a course at some skin clinic, and therefore the personal inspection of cases is denied to them. As in the study of osteology bones are essential, so also in the study of diseases of the integument one needs to have cases presented for his inspection, and he also requires more—he needs some one to teach him what to look for in each individual case, and how to see it. In dermatology looking and seeing are entirely different. The great Hebra, the father of modern dermatology, said a man should be able to make a diagnosis in diseases of the skin from what he sees alone. As this book presents numerous well-prepared plates, and the text tells one what to look for, it is, therefore, we consider, both the " bones to the osteologist" and a teacher.

There are already many atlases and text-books on dermatology, some better fitted than this to one who already has acquired a general knowledge of diseases of the skin, or who wishes to become or is a specialist—books and atlases which go into details and deal with all the rare and unique cases. This hand-book, we take it, was not written for them but for two great classes—the general practitioner and the student of medicine.

In comparing it to the well-known atlases, it has, we think, many distinct advantages. *Duhring's Atlas,* which we always considered the best of any, dealing, as it does, with types of disease, is unfortunately out of print, and therefore very expensive or unattainable. Only the commoner diseases are depicted in this atlas, so that to-day, in our best medical schools, where the study of dermatology is compulsory, the student on graduation is usually competent to diagnose the cases illustrated in that atlas.

Crocker's Atlas is very expensive, very bulky, and in numerous parts. The coloring in many of the plates is too blue or too brown, and, therefore, misleading on that account.

The *Saint Louis Hospital Atlas*, of Paris, is expensive, and the plates are made after models taken from living or dead cases. This is also a large and bulky atlas in numerous parts.

Fox's Atlas gives pictures made from photographs, and photographic plates do not show some cases of skin diseases to advantage. This also is a large and cumbersome book.

Therefore, the advantages which we see in this little book, and which recommend it to our mind, are: First, its handiness, on account of the size—7 by 4 inches; one can keep such a book on his table or in the book-case, and turn to it for reference in an instant. Secondly, the plates, which are, as a rule, most excellent, and occupy the whole page on which they are printed; there is no large blank margin, which usually weighs down the ordinary atlas so much. Thirdly, the vast majority of the plates are excellent as regards drawing, color, and the diagnostic points which they bring out. For example, Plate V, of varicella, shows that the lesions may be umbilicated, although such a careful observer and thorough teacher as Dr. Osler says in his book "there is no umbilication as in the vesicles of smallpox" (*Practice of Medicine*, 1892, p. 66), whereas all dermatologists know that umbilicated lesions may and do exist in varicella, as this plate most faithfully depicts. Fourthly, we can recommend the book because of the author's and publisher's selection of their American editor, Prof. Stelwagon, a writer of note, a careful and competent observer, one who has been a teacher for years, and one who knows the requirements and needs of the student of dermatology. We are pleased to note the editor has parenthetically added his own or the American view of this or that different disease, or the treatment of the same. For example, page 68, "acute contagious pemphigus" of the Austrian school is "an example of an anomalous form of impetigo contagiosa," and, page 180, "herpes tonsurans disseminatus" is "pityriasis maculata et circinata." Lastly, we recommend it becasue of the price, which is within the limit of *all*.

While there is much to praise, some of the plates are misleading, and the volume has its shortcomings. Plate XXXI, sycosis (?), we think depicts better tinea sycosis, as *all* the hairs have fallen out, as occurs in the parasitic variety. While this disease *may* occur on the upper lip, it rarely does, and the text here says "which (hairs) may be quite easily and painlessly pulled out." No mention is made of a microscopical examination for the tricophyton fungus or the differential diagnostic value of the same when considering sycosis vulgaris and tinea sycosis. Plate XXXII, furunculosis, looks more like that clinical entity ecthyma. Plate XXXIX, ichthyosis, is too inflammatory; it is evidently an ichthyosis associated with eczema. Plate LI, tuberculosis verrucosa cutis, lacks the violaceous tint.

In the text we note that eczema has only twelve pages for its definition, diagnosis, etiology, prognosis, and treatment. As eczema includes 35 per cent. of all diseases of the skin, we think it is at least entitled to a better definition than "an inflammatory affection of the skin accompanied by the subjective symptoms of itching and burning." Such a definition would apply to nearly all inflammatory diseases of the skin. Its clinical forms should be more fully described. The continued use of soap and water we note is not contraindicated in the treatment.

We are much pleased to note that the author makes a group of tuberculous diseases of the skin under five clinical forms.

Taken, therefore, as a whole, we congratulate the author, the editor, and the publisher for giving to the medical profession this neat and handy book, and we most heartily recommend it to all who wish to study dermatology, and have at hand for ready reference sixty-three colored plates and thirty-nine half-tone illustrations of cutaneous diseases, which, for the most part, are excellent. C. N. D.

VIERORDT'S MEDICAL DIAGNOSIS. A CLINICAL TEXT-BOOK OF MEDICINE FOR PHYSICIANS AND STUDENTS BASED ON THE MOST RECENT METHODS OF EXAMINATION. By OSWALD VIERORDT, M.D., Professor of Medicine at the University of Heidelberg, etc. Authorized Translation with Additions by FRANCIS H. STUART, A.M., M.D. Fourth American edition from the fifth German, revised and enlarged. Philadelphia: W. B. Saunders.

PRACTICAL DIAGNOSIS. THE USE OF SYMPTOMS IN THE DIAGNOSIS OF DISEASE. Fourth edition, revised and enlarged by HOBART AMORY HARE, M,D., etc. Pp. 631. Illustrated with 205 engravings and 14 colored plates. Philadelphia and New York: Lea Brothers & Co., 1899.

THE fourth American edition of Vierordt's excellent work calls for little notice beyond what has been said before. It is a good-sized volume of 603 pages, with many good illustrations and diagrams. It has been translated into clear and simple language. That part of the work dealing with physical examination, properly speaking, is very clear, concise, and good. While the general standard of the book is high, two sections, however, leave much to be desired. So important a question as the serum diagnosis of typhoid fever is treated of in a brief note of but twenty lines added by the translator, while the section upon the malarial parasite is not only incomplete but inaccurate. Statements such as " The parasite is found at the time of the fever or its appearance in the blood precedes the fever" are misleading; while the statement that " At the same time with the malarial parasites there is a moderate leucocytosis" is inaccurate.

In other respects, however, the work will hold its place as one of the most valuable and creditable treatises of its kind.

The rapidity with which successive editions of Hare's excellent work on *Practical Diagnosis* have appeared is evidence of its real and practical value. The fourth edition forms a handsomely bound volume of 631 pages. The work, as is well known, is more concise and less discursive than most foreign publications upon the subject, a fact which has its advantages and disadvantages; the author has, however, been happily consistent in this respect throughout the book. The language and descriptions are clear and direct, and the subject-matter has been brought well up to the time of publication. Thus, in this last edition, such facts as the diagnostic importance of eosinophilia in trichinosis have been judiciously noted. The diagram of Baas, illustrating the paths of the pupillary reflex, has been added, as well as several new illustrations. Some of the descriptions of disease pictures are particularly clear and good; such are those of pneumonia and pleurisy in the section on diseases of the thorax. The section upon "The Manifestation of Disease by Symptoms" contains also many valuable suggestions.

Upon the general excellence of the work it is unnecessary again to insist. Its very merit, however, justifies a few minor criticisms or suggestions.

On page 292, the author, while noting the value of Rotch's sign of pericardial effusion, judiciously states that he has observed the same manifestation in marked cardiac dilatation, but fails to mention the valuable observation of Ewart, that it is not so much the presence of flatness in the fifth right space, which is of importance in the diagnosis of pericardial effusion, as the association of this sign with the obliteration of the normal acute angle between the right border of cardiac dulness and the line of liver flatness—a point which the reviewer has in a number of instances been able to verify.

The assumption, on page 318, that a cardiac murmur in the absence of anæmia is a sign of organic cardiac disease, unless it be cardiopulmonary in nature, would appear to be rather too positive.

The consideration of Widal's test in typhoid fever and the section upon worms might, perhaps, be a trifle fuller.

On pages 61 and 62 Heberden's nodosities appear to be erroneously attributed to gouty deposits, a mistake which seems to be firmly rooted in literature.

On page 380, line 17, the word "plain" is doubtless a misprint for "pale" or "palely."

In one respect the work is cerainly the best of its kind—namely, its excellent illustrations. These are abundant and well chosen. In selecting the best cuts from literature, Dr. Hare has wisely avoided a prevalent tendency to sacrifice excellence for originality. The work is handomely printed and bound. W. S. T.

LEITFADEN DER ELECTRODIAGNOSTIK UND ELECTROTHERAPIE FÜR PRAKTIKER UND STUDIERENDE. (INTRODUCTION TO ELECTRO-DIAGNOSIS AND ELECTRO-THERAPY FOR THE PRACTITIONER AND STUDENT) By TOBY COHN, with preface by PROF. DR. E MENDEL. Berlin, 1899.

THIS is an elementary treatise upon a branch of therapeutics and diagnosis that is too frequently undertaken without adequate preparation or sufficient knowledge. As such a treatise, dealing only with the essential elements of the subject, it is one of the best that it has been our fortune to read. The material is systematically and logically arranged, the style is clear, and the statements are precise, but not so dogmatically positive as to lead the reader to believe that, having read and absorbed them, there is no other knowledge for him to seek. The book, moreover, trenches not infrequently upon some of the less well-known branches of electricity as applied to medicine. The physiological section is very excellent, much better than ordinarily found in the best text-books of nervous diseases, and yet so clearly stated that it is not beyond the comprehension of the ordinary medical student. Cohn is an exceedingly cautious writer, and when he has occasion to deal in theory usually adds a foot-note in which he apologizes for any possible inaccuracy of his statements; thus, in discussing the reasons for the occasional absence of the reactions of degeneration in cases of chronic progressive spinal muscular atrophy, which he explains by assuming the degeneration of isolated fibres in the muscle, the others remaining normal, he admits that many will fail to agree with his view, reasonable as it seems to be. The discussion of the reaction of degeneration and its significance is clear and thorough. The conditions in which the reaction occurs are discriminated from those in which it does not. The border-line cases—that is, those of progressive muscular dystrophy with the reaction—puzzle him as much as the rest of us, and he merely states that perhaps all the so-called idiopathic muscular dystrophies do not belong absolutely to that group. In reading this chapter, as in reading similar sections in other books, we have felt that the reaction of degeneration was made too complicated, and that there was too great a subdivision into types not sufficiently distinct from one another. Cohn, for example, recognizes the mild and severe forms of the complete reaction, and, in addition, a partial reaction, but finds as the only distinction between this and the mild form of complete reaction the occasional absence of quantitative alterations to Faradism. In addition to these three varieties we have also the faradic reaction of degeneration, characterized by a sluggish twitching of the muscle, the myotonic reaction, and the myesthenic reaction. The section on electro-cutaneous sensibility is not up to the standard of the rest of the work. The subject is treated carelessly and rather indefinitely. This, we believe, is a branch that will be of increasing value in the diagnosis of diseases by electricity. Not infrequently we have been able to detect marked dissociation of sensation, in which at times the pain and electric sensations were absent or blunted, while tactile sense remained intact. In one case the electro-cutaneous sensation was alone affected, all other forms of sensation remaining normal. The chapter on the resistance offered by the body to electric currents is very satisfactory. This is a subject to which too little attention has been paid in the ordinary works on electro-therapeutics. Cohn discusses it very thoroughly, including the method for measuring the resistance of the skin, both at the beginning of the application of the electrode and after it has become relatively constant. He does not, however, pay enough attention to the pathological significance of this phenomenon, and fails to mention, indeed, that cases occur in which the electro-cutaneous resistance seems to be abnormally or temporarily increased without apparent anatomical alteration of the parts. Being a true German, he devotes ninety pages to diagnosis and twenty-eight to therapeutics. In his introduction to the latter part, he takes occasion to pay his respects to those authors who deny the therapeutical value of electricity, and also to those who ascribe its effects entirely to suggestion. Should this latter theory be true, he argues, it would be absolutely useless to pay any attention to the kind of current employed, or to the mode of its application. When, however, he attempts to justify his own opinion that electricity is of direct therapeutic value, he is compelled to fall back upon comparative studies which show that certain curable affections recovered more rapidly under the application of electricity than otherwise; upon practical experience, which means practically nothing at all, and upon the *à priori* argument that electricity, which has produced such decided physical effects, ought, therefore, to have some specific action upon the diseased nervous system. We do not wish to criticise Cohn's aguments too severely, but they illustrate too forcibly how totally ignorant we are of the whole action of this agent, for it can be fairly stated that at present it is imposible to be certain whether it is the mere mechanical contraction of the muscle, or some specific action upon the trophic fibres in the nerve, or some chemical action upon the tissues themselves, if it be any action at all, that produces the beneficial effects. Aside, then, from the knowledge obtained from physiological experiments that the positive pole is the nerve-depressor, the negative pole the nerve-excitant, we are compelled to fall back, apparently, as Cohn admits, upon empirical experience. In the practical application of galvanic current, Cohn believes explicitly in the constant use of the galvanometer, a point that is often unfortunately too much neglected. Otherwise, he describes nothing particularly new. In cases of localized lesion in an accessible nerve he claims to have produced excellent results by passing ascending constant currents through the nerve. He warns particularly against the employment of Faradism when the pseudoparalytic myesthenic reaction is present. In the treatment of the disease of the spinal cord and of the brain, he mentions the methods of passing or attempting to pass constant currents through these organs. It is obvious to any one that the likelihood of getting an electric current through the spinal cord by placing one electrode on the neck and the other in the lumbar region is very faint, although Cohn believes that some of the deviated currents do affect the medulla spinalis. As to whether they do any good he is highly skeptical. At any rate, he believes that they are not to be used when acute processes are present. In regard to constant currents through the brain he is even more positive, and we gather from his statements that he never uses them, and rather disapproves of their use by others. The local application of electricity to the internal organs he believes to be useless and highly dangerous. Therefore, he discountenances the urethral and gastric electrodes. He is also rather skeptical of the benefit of the various artificial methods employed chiefly with a view of their suggestive qualities, such as the electric hand. In cases of hysterical paralysis, however, he believes that sometimes cure may be obtained at a single sitting by using, simultaneously with suggestion, rather strong faradic cutaneous stimulation. At the conclusion of the book are two chapters, one dealing with various forms of electrical apparatus and the other with Franklinization. Of the latter, after the description of the various varieties of applications, he has only to say that electro-diagnostic attempts hitherto made have not yet led to definite conclusions. In one respect Cohn is to be heartily congratulated. He appears to have accomplished the impossible, and to have devised a form of illustration which shows, even more satisfactorily than those first published by Erb, now copied in almost every text-book, the points of application of the electrodes for the purpose of stimulating the various nerves and muscles of the body. Briefly, these illustrations consist of an anatomical plate, upon which the muscles and nerves are shown, and a translucent leaf folded over this, upon which is printed the external appearance of the part, with red dots indicating the points for the application of the electrodes. As far as we know this is a distinctly original method of illustrating this subject, and very much more artistic than those hitherto employed. J. S.

TRAITÉ PRACTIQUE DE RADIOGRAPHIE ET RADIOSCOPIE, TECHNIQUE ET APPLICATIONS MÉDICALES. By A. LONDE, Directeur du Service photographique et radiographique a la Salpêtrière. Paris: Gauthier-Villars, Imprimeur-Libraire, 1898.

THE author of this work is not a physician, and has, therefore, naturally devoted himself more to the technique of the subject than to the medical side. He describes well and at length, and shows by excellent illustrations many forms of apparatus, such as vacuum pumps, a great variety of Crooke's tubes, appliances for X-ray work and the method for their use. To this part of the subject more than half the volume is devoted. In the addenda a description is given of a Crooke's tube, with a vacuum regulator similar to the one devised by Dr. W. H. Rollins, but the writer lowers the vacuum in the tube by heating the regulator, as Dr. Rollins formerly did, until the latter found the better way of lowering the vacuum by means of the electric current; this means is more accurate, and by it the vacuum may be lowered to the exact point desired. A comparatively short portion of the book is given to the various surgical and medical uses of X-ray photography, such as the study of the formation of the skeleton at different ages and congenital malformation; the value of the radiograph in myxœdema as an aid in diagnosis, and in the opportunity it gives to observe the improving effects of the treatment, is considered. This book presents the technique of X-ray work more fully and better than anything thus far published.

This and Regnier's book on X-rays are two among many on the subject that have appeared during the past two years, and they indicate the development of this method of examination, which is in daily use in many of the large hospitals of the world, and are in themselves the immediate result of work done in two hospitals in Paris—La Charité and La Salpêtrière. Since the discovery of the X-rays many minds have been directed toward their adaptation to surgical and to a less extent to medical diagnosis, and in the United States especially much has been done to overcome the obstacles to their practical application.

F. H. W.

RADIOSCOPIE ET RADIOGRAPHIE CLINIQUE. By L. REGNIER, M.D., Chef de Laboratoire d'Electrotherapie et de Radiographie de l'Hôpital de la Charité. Paris: J. B. Ballière et Fils, 1899.

IN the introduction to this small book the writer gives a brief history of the X-rays, in which the discoveries of both Lénard and Röntgen are recognized. In the book itself various forms of apparatus are well, though briefly, described, and their method of use indicated. The clinical applications of the X-rays are well outlined, and that part of the work relating to the medical uses of these rays is especially emphasized. Their aid, for example, in diseases of the lungs and heart and of the large vessels is discussed; and the distinction made between gout and rheumatism is also considered. Under obstetrical uses the author shows how pelvic deformities may be recognized, and he also cites a case of extra-uterine pregnancy in which the diagnosis was made by means of a radiograph. In short, this book indicates briefly the scope of this new method of examination, and is for its size one of the best that has been written. F. H. W.

An Essay on the Nature and the Consequences of Anomalies of Refraction. By F. C. Donders, M.D., late Professor of Physiology and Ophthalmology in the University of Utrecht. Revised and edited by Charles A. Oliver, A.M., M.D. With portrait and other illustrations. 8vo., pp. 81. Philadelphia: P. Blakiston's Son & Co.

The editor has embodied in this work in a series of paragraphs the gist of Donder's extensive treatises upon optics and ophthalmology. The book is presented in an attractive form, and will serve to recall the teachings of the great Dutch master. W. C. P.

Saunders' Medical Hand Atlases. External Diseases of the Eye, Including a Brief Treatise on the Pathology and Treatment. By Prof. Dr. O. Haab, of Zurich. Edited by George E. de Schweinitz, A.M., M.D. With 76 colored plates and 6 engravings. Philadelphia: W. B. Saunders, 1899.

This volume is quite up to the high standard which has been set by other numbers of the series of hand atlases which have already appeared. The illustrations are excellent, and the book is offered at such a low price that every student has it within his reach to possess a work which will be an excellent substitute in the absence of clinical material, and a good guide for comparison in studying cases where the diagnosis is in doubt. The work is not a text-book on ophthalmology, but when employed in the manner which has just been indicated it will be found of great value. The reviewer heartily recommends it to all students of ophthalmology. W. C. P.

A Manual of Diseases of the Nervous System. By Sir W. R. Gowers, M.D., F.R.C.P., F.R.S. Edited by James Taylor, M.A., M.D., F.R.C.P. Third edition, Vol. I. Philadelphia: P. Blakiston's Son & Co., 1899.

The third edition of this standard text-book of nervous diseases comes to us with a reputation unequalled, perhaps, by any other work in the field of neurology. In recommending it as a text-book to their students, the universities of the continent have paid it an honor which but few translations from English ever receive.

The influence of Taylor, whose name as editor appears in this edition for the first time, is seen in every chapter of the book. That portion of the work concerned in the anatomy and physiology of the ganglion cell is especially praiseworthy. The newer investigations into the finer anatomy of the axis-cylinder and its primitive fibrils are recorded with perhaps not as much credit accorded to the epoch-making studies of Apáthy as they deserve.

If there be room for criticism in connection with the work it is that the illustrations do not come up to the standard of the rest of the work. An appendix by Batten on the anatomy and pathology of the muscle spindle completes the volume. D. J. McC.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Bilateral Swelling of the Submaxillary Salivary Glands in Typhoid Fever, without Enlargement of the Parotids.—Milton Miller (*The University Medical Magazine*, July, 1899) reports a case with this unusual sequela on the twenty-seventh day of the disease, two days after normal temperature had been reached. The painful swelling of the left gland was succeeded in three to four days by a similar condition in the right. A rise of temperature to 102° was observed; resolution without suppuration took place, and in two weeks no swelling was visible.

Miller was able to find but one similar instance, Hoffmann (Leipzig, 1869) reporting a case ending in suppuration of the left submaxillary gland.

In the medical clinic at the Johns Hopkins Hospital suppuration of both glands was observed this year in a colored boy rather late in the disease; streptococci were the only organisms present.

The Role of the Meningococcus in Meningitis.—Netter (*Societe de Biologie*, June 17, 1899), reporting twelve cases of cerebro-spinal meningitis in which the meningococcus or diplococcus intracellularis meningitidis was found, apparently still adheres to his views expressed in the *Twentieth Century Practice*. The accepted view of the epidemicity of the disease caused by this organism is not recognized by this observer. Chantemesse, opposing Netter, speaks for the recognition of the epidemic nature and specific character of the meningitides associated with meningitis. Netter's ideas that the meningococcus is a derivative and degenerate form of the pneumococcus seems to Chantmesse quite erroneous.

Griffon identifies one organism of Netter's "the streptococcus derived from the pneumonoccus" as the "streptococcus meningitidis of Bonome."

Etiology and Diagnosis of Cerebro-spinal Fever (*Lancet*, June 24th). In the Cavendish lecture for 1899, OSLER speaks of epidemic cerebro-spinal meningitis as a disease to be distinctly differentiated from other well-recognized primary and secondary meningitides. The epidemic features of the disease and its bacteriology are first discussed. Netter's rather remarkable and illogical conclusions are strongly objected to. In the diagnosis the sudden onset, the irregular style of fever, skin eruptions—herpetiform and petechial—leucocytosis, and arthritides are given prominence; the value of Kernig's sign in the recognition of meningitis and the great diagnostic worth of Quincke's lumbar puncture are considered; no distinct therapeutic results are ascribed to the latter.

In thirteen of fourteen cases in which lumbar puncture was performed at the Johns Hopkins Hospital the specific organism was demonstrated; large amounts of turbid or bloody fluid were frequently obtained—as much as 126 c.c. on one occasion. At times clear fluid may be found.

Sporadic meningitides, according to Osler, may be due to the meningococcus or to the diplococcus pneumonia, which may be a primary or secondary infecting agent.

Morphine, ice-sponging, frequent lumbar punctures whenever symptoms of pressure from accumulation of fluid appeared, formed the main line of treatment. Laminectomy and draining of the cord were undertaken in two cases in Dr. Osler's wards with no very marked results.

Pleurisies Due to the Bacillus Eberth.—Pleurisies caused by the typhoid bacillus may be serous or hemorrhagic, but according to Labiche are most often purulent, occurring most frequently during convalescence; they may exist independently of lesions in the lungs, although bronchopneumonia and bronchitis frequently precede. The physical signs are those of most pleurisies; the temperature is not to be considered as a guide to the local condition, pleural and hemorrhagic pleurisies existing with little or no fever. These typhoid pleurisies may be of quite long duration—in one case eighty days; they may resolve, or thoracentesis or an operation for empyema may be necessary.

LABICHE considers the prognosis serious, and advises frequent exploratory punctures, in order to observe the nature of the fluid. The cold bath has no share in the production of the pleurisy, and is not contraindicated should pleurisy develop; ultimate resolution depends upon general amelioration of the patient's condition. Operation or thoracentesis are only to be resorted to should the symptoms become intensified, since even purulent exudate may completely resolve.—*Gazette Hebdom.*, 1899, No. 17.

Acute Myocarditis.—RENAUT describes acute myocarditis produced experimentally in animals by inoculation of toxins of diphtheria, as showing, first, granular degeneration of the cardiac muscle cell with disappearance of the transverse striation and a colloidal-like transformation of the smooth, muscular coat of the smaller arteries. Subsequent lesions are seen as areas of disintegration and vacuolization of the heart muscle fibres, and slight infiltration of the connective tissue. The process, as a whole, may be called an acute parenchymatous myocarditis. Myocarditis, due to diphtheria toxin, in the human subject is practically identical with the experimental disease; the myocarditis in typhoid fever is of a much less severe type; that seen in pneumonia resembling closely that of typhoid, but shows no "congestive œdema" of the myocardium. In all the same alterations of the small arteries is seen. Either the toxins of these organisms or the presence of the organisms themselves may be responsible for the changes found, the Eberth bacillus and the pneumococcus having been frequently found in lesions. The symptomatology of the development of myocarditides is very similar in all; at onset there may be seen a short period of cardiac excitation, rapid, strong pulse, of good tension, and strong pericardial shock; then ensues a gradual weakening of pulse, with loss of tension, and a vague undulation in place of previous cardiac shock, tachycardia and other disturbances of rhythm being associated. Myocardial lesions which are exclusively parenchymatous have no distinct clinical history; the interstitial affections, according to Renaut, have a "fine and definite symptomatology"; these develop always in convalescence, usually when the first movements are made. Extreme weakness, often vomiting and diarrhœa, and, on the part of the heart, tachycardia and arrythmia are seen, disappearing if the process does not become more marked, but in the event of its aggravation a true acute asystole may occur.

Suppurative myocarditis may resemble ulcerative endocarditis in its symptomatology, with its embolic and general phenomena; intense præcordial pain may be present, radiating to back and abdomen; syncopal tendencies occur.

Renaut also describes a parenchymatous acute myocarditis of infants, differing greatly from other forms. This form is an acute or subacute myocarditis, developing in the course of rheumatism, erysipelas, or typhoid, especially in children already the subjects of valvular disease. Suddenly, in the course or termination of the disease, signs of myocardial weakness appear, but therewith no arrythmia, no "bruit de galop"; though usually fatal, there may exist a less severe, curable form.

Whether complete resolution of an acute myocarditis can take place seems doubtful; in animals one and two years after experimental inoculations, distinct evidences of former trouble could be made out.

Diagnosis rests upon the previously mentioned symptoms; treatment should be to quiet the preliminary excitation, if present, to sustain the heart and to relieve arterial tension.—*Pressé Med.*, July 29, 1899.

Osteo-arthritis of the Spine; Spondylitis Deformans.—GOLDTHWAIT, reviewing the literature on this subject, and reporting ten cases with illustrations, insists first upon differentiating spondylitis deformans from other types of rheumatoid disease, chronic in character and leading to joint ankylosis, but in which there is atrophy of all the joint structures, with no tendency to nodular growth or caseous deposit.

Spondylitis deformans is a disease of adult age, not necessarily old age, some cases developing in late adolescence; its etiology is not clear; gonorrhœa is given by some as the probable cause; in a majority of cases a history of exposure is found.

Goldthwait refers to Bland Sutton's observations illustrating the disease in an Egyptian mummy, and to Sutton's reports of the same disease in cattle, as evidence of its long standing and wide distribution. The pathology of the disease consists in nodular enlargement of the edges of the articular cartilages, with subsequent ossification of the nodes and extension of the process into the ligaments adjoining. With the hypertrophy at the edges of the cartilages there is atrophy of their centres or areas of pressure.

In the spine the process usually begins at one side anteriorly, and extends up or down along the anterior lateral ligament; it may remain localized here, or may spread up, down, or across. With the progression of the disease the intervertebral substances atrophy, causing often the rounding of the back; if the vertebræ are ankylosed before complete atrophy of the intervertebral disk, a straight back may remain.

Similar changes take place about the transverse and occasionally the spinous processes, giving rise to the symptoms of paralysis or disturbed sensation by narrowing the various foramina.

In proportion to the changes found, the clinical symptoms are slight; pain in the back, stiffness, rigidity, limitation of movement being chiefly complained of. In the event of the ribs becoming involved, the thorax becomes fixed, and respiration may be entirely diaphragmatic.

The diagnosis of Pott's disease may be difficult in the early stages, particularly if there is prominence of the affected part, neuralgic pains, disturbances of sensation, and paralysis may be present, resulting from pressure; rarely are the two sides of the body, however, affected alike, differing thus from Pott's disease; the paralysis is also peripheral in type—not central, as is usual in the latter disease. The resulting deformity has a wide range of variation; lateral deformity is rare.

Treatment should be nourishing and strengthening. The ordinary rheumatic remedies are to be avoided. Stimulation, bathing, electricity, and massage may give relief, and some mechanical supports prevent progressive deformity.—*Boston Medical and Surgical Journal*, August 10, 1899.

Characteristics of Blood-serum in Certain Varieties of Purpura Hemorrhagica (*Societe de Biologie*, July 1). In five cases of purpura, including purpura hemorrhagica, rheumatic purpura, and purpura occurring in cancer and tuberculosis, SICARD makes the following observations: "Coagulation of the blood taken from veins in large quantities (10 to 15 c.cm.) occurred within normal limits; on the other hand, the retraction of the clot and exudation of serum took place with the blood of one case only—the blood of the tuberculous patient with purpura—the other specimen of blood producing but ten to twelve drops of serum.

"Of more importance and interest is the fact that this serum exuded in such small quantities has not the power of rendering coagulable a liquid not spontaneously coagulable, as, for example, certain hydrocele fluids. Normal sera added to such fluids in proportion of·1 to 80 will, according to Sicard, induce coagulation in four to six hours. The sera of two cases of purpura hemorrhagica were absolutely devoid of this quality; that of rheumatic purpura and cachectic purpura showed minute traces, while the serum of the tuberculous case reacted like normal sera.

"Calcium chloride in minute quantities added to the blood of the purpura hemorrhagica cases produced rapid retraction of the clot and sera, which showed reaction of normal serum in a more or less complete fashion."

Sicard suggests that in the serum of certain purpuras the fibrin ferment, or its zymogen, is not present in sufficient quantity to cause more than simple coagulation of the blood. The subsequent retraction of the clots may be due to another variety of fibrin, the zymogen of which is absent in purpura.

The Symptomatology of Tumors Involving the Hypophysis Cerebri.—STEWART (*Montreal Medical Journal*, June, 1899), in introducing this subject, remarks that there are on record a number of cases of tumors involving the destruction of the hypophysis where no symptoms of acromegaly were present. Stewart presents two cases, in one of which the symptoms were those of a rapid, infiltrating neoplasm of the anterior part of the base of the brain. In the second, in addition to signs of direct cerebral pressure, there were symptoms suggesting pernicious anæmia and myxœdema.

The first case was admitted complaining of dimness of vision, headache in temporal and parietal regions, and occasional vomiting. On examination the outer half of the field of vision in the right eye was gone. Light perception was reduced in both eyes, and simple atrophy of both nerves was found; the optic atrophy progressed. The urine contained albumin and casts. Death occurred in a month. After development of continuous headache and later stupor, a bloody discharge from the anterior and posterior nares was observed during the last few days. At autopsy the sella turcica was found occupied by a lobulated tumor mass, 5 cm. by 4.75 cm. No trace of pituitary body was to be seen. The tumor had eroded the body of the sphenoid, and on the left side passed along the lesser wing of the sphenoid to the back of the orbit; it was pressing upon and had flattened the optic commissure. The pathological report classifies the tumor as a perithelial angiosarcoma of the pituitary body. Extensive degeneration of the optic nerves was found. There were cirrhotic changes in the kidneys, uterus, and ovaries, to which changes, in connection with hypophyseal growth, Stewart calls special attention. During life there were no symptoms of acromegaly or of anæmia.

In the second case, a man of forty-two years came under observation complaining of failing vision and headache; there had been vomiting of cerebral character some time previous. The patient had giddy sensations and tendency to fall forward.

On examination no perception of light was found in the left eye; the pupil was immobile, but reacted on stimulation of the right eye with light. In the right eye complete blindness to the outer side of the field; inner side amblyotic. Both optic disks were affected, the left showing white atrophy, the right being merely pale.

There were no objective disturbances of sensation or motion; the patient complained, however, of numbness of the hands and profuse perspiration about the head and neck. The subsequent course of the case was very slow; sight failed completely in a year and a half; the patient became very fat and anæmic; the face and extremities were puffy, but would not pit on pressure, resembling myxœdema. Four years from the date of the first observation the condition resembled pernicious anæmia, the blood-count being as low as 2,100,000, and a typical lemon tint had developed in the skin. Slow cerebration; hallucinations of sight, smell, and hearing developed in the next two years, and after six years of the above symptoms the patient died.

Tumor of the optic chiasm was diagnosed. Autopsy showed a large tumor of the pituitary body, extending more to the left than to the right; the surrounding bones were atrophied. Histologically the tumor was endothelioma. The thyroid was normal.

The combination of the myxœdematous condition and pallor of the skin in connection with the pituitary tumor are emphasized by Stewart.

Pechkranz, of Warsaw, in a case of sarcoma of the pituitary, mentions as a prominent feature a myxœdematous condition of the patient, considering it identical with pachacria mollis of Arnold.

Anders reports a case of hemorrhagic tumor of the pituitary and infundibulum in a case of pernicious anæmia, with symptoms of giddiness, headache, nausea, loss of consciousness, and delirium.

Notes on Two Hundred and Fifteen Cases of Typhoid Fever.—BOSANQUET'S (*British Medical Journal*, July 18, 1899) reports show that in the eight years from 1890 to 1898 the last four months of the year brought in 150 cases, there being 47 in October alone.

Onset with definite rigor was recorded in 5 cases; in 2 convulsions ushered in the attack; troublesome diarrhœa and obstinate vomiting were met with in 22 and 15 cases, respectively.

In 42 instances the spleen was palpable; hemorrhage from the bowel occurred in 21 cases (once as late as the fifty-seventh day of the disease); 12 cases in which perforation was seen ended fatally. Ten cases were complicated with pneumonia; 3 with pleurisy, acute nephritis, and arthritis, respectively. Under affections of the nervous system 2 cases of peripheral neuritis (paralysis and foot-drop) developed late in the illness. Among cardio-vascular accidents are mentioned 6 cases of thrombosis of the femoral vein—one of the pulmonary artery and one instance of embolus of the right iliac artery, causing fatal gangrene of the leg; cerebral meningitis was found in one fatal case. Sixty-eight per cent. of the cases showed typical roseola. In one case urticarial wheals were present.

Relapses occurred in 59 cases, once after twenty-six days of apyrexia; periostitis was met with as a sequela in three instances, once, however, on the twenty-fourth day. Forty cases ended fatally, a mortality of 18.5 per cent. There were 14 deaths from perforation, 3 of which were multiple; one perforation was of the large intestine. In 21 instances lesions were present in large intestines, extending to the rectum in 3, and affecting the appendix in the same number of cases. One instance each of ulcer in the larynx and in the stomach is recorded.

The Brand method was not employed in treatment, sponging and occasional antipyretics taking its place. Antityphoid serum had no effect in a few cases to whom it was administered.

Typhoid Infection without Intestinal Lesions.—LARTIGAU (*New York Medical Journal*, July 29, 1899) reports two cases proving at autopsy to be general infections with the typhoid organism, though without any traces of intestinal lesions.

The first case, after two weeks' illness, showed a moderately high temperature, with cough and shortness of breath; six days after admission the patient had a series of convulsions, with retraction of the neck and dilatation of the pupils, and during the night a chill, death ensuing shortly after. At autopsy, in addition to a pyocyaneus bronchopneumonia, there were red and white infarctions in the liver and kidneys. Lymphomata could be demonstrated in the liver and cloudy swelling of the cells. From the liver, gall-bladder, kidney, and urine typhoid bacilli were isolated in pure cultures. The patient's blood after death gave a distinct Widal reaction.

In the second case death ensued three days after an operation for ectopic pregnancy; the autopsy showed an acute splenic tumor, cloudy swelling of the liver and kidneys, and endometritis; operation wound clean and sterile. Typhoid bacilli were isolated from the liver, gall-bladder, and kidneys; typhoid bacilli and streptococcus from the uterus; pneumococci from heart blood and spleen. Blood post-mortem gave distinct Widal reaction. No intestinal lesions were to be seen, nor were changes in the mesenteric or retro-peritoneal glands made out. It can be objected that in the patient's history there is mention of a three weeks' febrile attack, occurring four months previously. The author considers the wide dissemination of the organisms and their unusual localization to indicate a more recent infection. A very interesting feature in this case is the polybacterial infection present—typhoid, streptococcus, and diplococcus apparently all playing a part.

Etiology of Malarial Fever.—THIN refers to the already well-known researches of Ross and Manson on the theory of inoculation by mosquitoes, and to Grasse's experiments in 1898, which apparently limit the power of inoculation to certain genera of mosquitoes. Bignami's experiments, at first negative, later positive, when the particular "genus" was allowed to bite the subject, are to THIN very conclusive. Bignami's and Bastianelli's results allow them to conclude positively that "the 'genus' of mosquito, *anopheles claviger*, may be made to bite a subject suffering from malarial fever, and then, if kept at the proper temperature (30° C.) for the number of days requisite for the development of the sporozoites, may inoculate healthy patients by this bite. These patients will develop malaria, usually within a certain time, the parasite being the same as was present in the first instance."

According to GRASSI, BIGNAMI, and BASTIANELLI, the temperature at which the mosquito host is kept influences materially the development of the parasite. In mosquito bodies kept at 15° C. after biting no development occurs, the most favorable temperature being from 20° to 30° C. When crescents have been taken up by the mosquito they remain almost unaltered for some hours: at forty hours a distinct nucleus can be made out, with central chromatin and the protoplasm is vacuolated; after six days the large swollen parasites are seen in the thickness of the middle intestine bulging into the lumen, and are found to be composed of a number of small bodies, sporoblasts, which, becoming sporozoites, burst from the capsule into the intestine and are distributed throughout the mosquito body, being found in great numbers in the tubes of the salivary glands. In tertian fever the mature non-sporulating forms develop in the anopheles; some slight differences from the subsequent developmental processes of the crescents are to be made out, and Bignami and Bastianelli describe a female form, "malthrogameti," and a male, "mithrogameti." The observers were unable to show that the mosquitoes transmitted the sporozoites to their offspring, experiments in this line being negative.

Other spore-like bodies are to be seen in mosquito bodies, the nature of which is as yet undetermined.—*Philadelphia Medical Journal*, August 12, 1899.

SURGERY.

UNDER THE CHARGE OF

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The Formation of a Cleido-humeral Nearthrosis.—OLLIER (*Rev. de Chir.*, July 10, 1899) reports in detail the results of an operation which he had previously mentioned in a communication to the Académie des Sciences. The patient had received an injury in the battle of Metz, which had necessitated the removal at various times of different parts of the scapula and the upper portion of the humerus. He was left with a defective shoulder, which prevented any use of the arm, although the forearm muscles were intact and functionally capable; the upper arm had no point of fixation, and the arm was consequently helpless. The only bony point to which it could in any possibility be attached was the end of the clavicle, from which the proximal end of the humerus was separated by a distance of 7 cm., which was filled up by dense cicatrices. Various forms of apparatus had been tried without success, and operation was demanded. He resected a piece from the end of the humerus subperiosteally, and attached it by two silver-wire sutures to the freshened end of the clavicle, uniting the periosteum by catgut sutures, and attaching such of the tendons to the humerus as were available of those forming the shoulder-joint and springing from the scapula. A portion of the deltoid remained attached to the clavicle, though somewhat atrophied; the remainder, that could be separated from the cicatricial tissue, was attached to the trapezius muscle and other portions to the fibrous tissue surrounding the extremity of the clavicle, thus forming a digastric muscle. The dressing applied was occlusive and the healing rapid; the arm was, however, kept in a fixed position, with the idea of obtaining bony union. It was apparent that this was not practical without the loss of the muscular development of the arm, and the dressing was therefore arranged so that the muscular stimulation could be applied to the deltoid and other muscles surrounding the shoulder. When it was seen that bony union was not probable, passive motion was employed and the arm dressed, so that the forearm muscles could be exercised. There was thus formed a fibrous union between the bones which permitted considerable motion. The silver suture could not be felt, as plastic exudate had covered it over. There was, of course, a considerable shortening in the upper arm, but the patient at the end of six months could carry a weight of 40 kgs., and flex the forearm with a weight of from 12 to 15 kgs. The condition continued to improve till the arm could be abducted to a right angle with the body and he could lift a weight of 57 kgs. from the ground without any apparent separation of the new joint.

There was complete tolerance of the silver sutures, which never produced any irritation. One of them, however, tore out. The radiographic examination was very instructive. The head of the humerus, which had been rarefied in its structure, was shown to have thickened. While one of the silver sutures had been torn out, the other apparently did not serve to hold the bones together, but only acted as a point about which the bone moved. The movement of abduction showed that the inner silver wire had torn out of the humerus. No true articular cavity could be detected, and the joint was probably entirely fibrous in its structure.

This operation is indicated only when there has been total loss of the scapula and a portion of the humerus. Where a typical resection can be made subperiosteally, there forms in young subjects sufficient new bone for the strengthening of the joint and the preservation of its functional usefulness. In older subjects, although new bone may not form if the periosteum can be preserved and the attachments of the muscles to it, the fibrous tissue formed will be sufficient to secure a useful arm. The important feature in all such resections is to maintain the integrity of fibrous tissue, uniting the various groups of muscles that form the power of the joint and enter into the formation of the articulation.

Nerve Complications in Fractures of the Lower End of the Humerus.—BROCA and MOUCHET (*Rev. de Chir.*, June 10, 1899) find that there are a number of causes which can account for injuries of the nerves in this region. They divide them into primary and secondary groups. These groups are according to the etiology and treatment required. There is also a third class, which is made up of injuries that are manifested only at a remote period after the injury is sustained.

The primary injuries are complete section of the newer partial or complete tears; stretching by a dislocated fragment of bone; a fragment completely detached may press upon and injure the nerve; it may become impacted between the fragments. The most frequent source of this class of injuries is a contusion. It may have any degree, may produce permanent paralysis, with an ascending neuritis as a complication, in spite of the most skilful surgical intervention. The ulnar nerve, on account of its superficial situation, is most liable to these injuries, and when this nerve suffers injury it is more liable to be caused by a contusion than by the fracture which has taken place near it. It is well to remember that these serious nerve injuries may take place after a very simple injury of the elbow, where such complications are not suspected. The paralysis does not always become evident at the time of the fracture, and may not show itself till the week following. It may not appear till after the nerve has been enveloped by callus, the two causes acting together to produce the injury.

The injury produced by secondary causes may be from a callus or by a fragment that has not been completely reduced. The callus when exuberant may envelop the nerve for some distance, and produce its effect by compression. The injury produced by fragments not completely reduced is, these authors believe, the most frequent of all sources of nerve injury in these fractures. Before the employment of the Röntgen rays cases were very frequent in which exuberant callus produced nerve injury. Since the introduction of this positive and accurate method of diagnosis it has been shown that these bad results were more frequently due to partially reduced fragments than to callus. Exuberant callus was blamed where vicious position was at fault. In fracture about the elbow the supracondyloid fracture, in a diagonal plane through the lower portion of the humerus, is the one most likely to result in this form of injury, the proximal fragment overlapping the distal anteriorly, and exerting pressure with its point upon the nerve. The authors have confirmed the evidence given by the skiagraph in two instances of this character by operation and relief of the condition. A spicule of bone implanted in the nerve has been reported as one of the secondary causes, but it is probably very rare in actual practice.

The evolution of these paralyses from a clinical stand-point varies very much according to their etiology. In certain cases it is insidious; there is only a slight tingling sensation or sharp lancinating pains in the nerve, then little by little there appears a functional impotence in the muscles supplied by that nerve. This is the type of paralyses due to compression. Those due to primary injuries are more rapid in their development. The motor function, instead of being gradually progressive in its impairment, reaches the maximum at first. This is what happens in the section or the contusion of nerves where the injury is severe. Some cases recover of themselves; others are permanently injured, while there are cases all the way between. Degeneration may take place, the patient presenting with acute spontaneous pains, more or less marked, a hyperæsthesia more or less extensive, cramps, and fibro-tendinous retractions. The injury may not be more than a traumatism, or it may reach the spinal cord and give rise to the vexatious symptoms of an ascending neuritis.

The surgeon should always make a careful examination in these cases after he has been called, and tell the family if any nerve lesion is present, and also that there is a possibility of one developing. It should always be borne in mind that there may be present hystero-traumatisms in adults or in children. The difficulty, however, is not to recognize the presence of the paralysis, but to determine the nature of the lesion. *A priori*, in the presence of primary paralysis a contusion should be suspected. The interposition of the nerve between the fragments is rare and readily recognized by pressing the fragments together. The section of the nerve is rare; it is probable when a paralysis occurs immediately after the accident, although a contusion has always to be considered.

During the period of callus formation the diagnosis can be readily made by the aid of the Röntgen rays. A malposition is the most frequent cause. The course of the nerve should be carefully palpated and any irregularity noted. In practice electrical examination alone will determine the amount of the paralysis and injury of the nerve and the prognosis.

The treatment is entirely dependent upon the condition and its early recognition. A section, if recognized immediately after the injury, demands immediate surgical intervention. Careful examination by electricity must at first determine the extent of the injury, and its exact location must be definitely determined before intervention can secure valuable results. In cases where the cause is an overlapping fragment, the portion producing the injury should be excised. By far the better plan is to prevent these injuries by determining by the Röntgen rays the exact nature of the osseous lesion, and by ascertaining after its reduction, by a second skiagraph, that perfect coaptation of the fragments has been secured. Where true exuberant callus is present the nerve must be freed.

Delayed Suturing in Packed Wounds.—Köppen (*Cent. f. Chir.*, July 1, 1899) calls attention to the fact that it is not good surgery to place stitches in the flaps of the wound, which it is necessary to pack with gauze. There are many reasons why this should not be done. If we are uncertain of our asepsis sufficiently to make it necessary to pack the wound, there is no logic in putting in sutures while the wound is septic. They may become infected and lead to stitch abscesses after the gauze packing has been removed and the wound closed; they will frequently become weakened while the surrounding tissues may become the seat of a phlegmonous infiltration. The sutures can be readily inserted at a later period by the use of a eucaine B. solution—eucaine B. 0.1, salt 0.8, water 100. This solution anæsthetizes the part sufficiently to permit the insertion of the sutures, and in addition permits the removal with a curette of the granulations that have formed, so that a more nearly primary union will be the result.

Three Cases of Urethral Calculi Impacted in the Lower End of the Ureter, and Removed by Suprapubic Cystotomy.—Bishop (*Edinburgh Medical Journal*, July, 1899) reports three very instructive cases of this condition, which he believes is not so infrequent as is generally supposed. Some calculi become impacted in the ureter, and if they do and are not removed, the consequences are extremely serious. If the impaction is double —*i. e.*, on both sides—anuria results, with death on about the thirteenth to the twentieth day. If single, and the impaction is absolute, intense pain, followed by atrophy of the corresponding kidney, occurs. If the impaction is not complete, or if the stone is shifted from time to time, hydronephrosis, with intermittent attacks of renal colic, possibly pyonephrosis or pyonephric abscess, with their concomitants, are the result. There are three places where these calculi tend to lodge, although they have been found in other portions of the tube. They are at the infundibulum, about the brim of the pelvis, and at the vesical end. The impaction at the vesical end is the result of the normal narrowing of the ureter and the presence of additional fibres which make it valvular at this point. The irritation produced by its passage causes contraction, which aids in dislodging the calculus if it is short, but is unable to force along an oblong calculus, which is the type generally found impacted. If the calculus projects into the bladder, and is rough, fresh salts are deposited upon it. If, on the other hand, it is smooth or flush with the orifice, the urine from the other kidney acts upon it and washes part of it away.

Of the three cases reported two were in males and one in a female. In the first there were symptoms of stone present, but none had been detected by previous examinations. When examined a calculus was found which did not change its position, and was apparently encysted. Suprapubic cystotomy showed it to have occluded the ureter and to lie in its orifice. The stone was removed and the patient recovered. The second patient was a lady of thirty-five, married thirteen years, with no children or miscarriages. She had had renal symptoms for twenty-two years, and had complete suppression at twenty-two. The symptoms had been aggravated at menstrual periods, and both ovaries and tubes had been removed. There was an intermittent hydronephrosis, with paroxysms of renal colic. The calculus was not to be felt by vaginal examination, but could be readily detected per rectum. The urethra was dilated and the stone felt, but it could not be moved. Suprapubic cystotomy was at once done, the ureter slit up on the calculus, and the calculus removed. Absolute anuria, up to forty-eight hours, followed the operation, then death occurred. No post-mortem was allowed. The third case was a boy of seven years, who had symptoms of vesical calculus, and one was removed at a subsequent operation. The patient, however, did not get on well, and while examining per rectum for an abscess a calculus was found impacted in the right ureter. It was removed by the suprapubic opening, and the patient made a rapid recovery. The author believes that the suprapubic route is the best for the removal of these calculi, except in the female, when it can be detected per vaginam.

The Sterilization of Catheters and Bougies.—NICOLL (*Annals of Surgery*, June, 1899) has made a careful critical study of the different forms of bougies and catheters upon the market and of the various methods of sterilization which have been proposed. The results arrived at from this exhaustive research are not altogether definite, nor is he inclined to be dogmatical; they are, however, of great value to those who constantly employ these instruments. He finds that the ordinary bougie, either metallic or soft, can be rendered sterile by washing carefully and drying with a towel or gauze, rendered sterile by boiling. The use of antiseptic solutions is unnecessary; they injure the outer texture of the instrument, and this makes infection more liable. As soon as they become scratched or injured metal bougies should be polished and re-plated, while soft ones must be thrown away.

The problem in connection with catheters is rendered more difficult by the inability to reach their interior and the difficulty experienced in making this smooth in the manufacture. Metal or Jaques' soft rubber catheters can be rendered positively sterile by boiling or washing, and soaking in strong antiseptic solutions that do not injure them. It is, however, impossible to render gum-elastic or varnished catheters sterile when for any reason they have to be employed, as where the surgeon cannot himself use a metal instrument for the patient, and a stiff one is required. A gum-elastic catheter that is smooth and well finished inside may be rendered reasonably secure by having the patient hold it for a time under a tap and then lay it aside immersed in a boric solution, a weak perchloride, or other weak antiseptic solution.

He has made it his rule to use bougies in preference to catheters wherever it is possible. Where a catheter has to be employed, he uses a metal or a soft rubber one. When the urine is purulent or septic the catheter must be destroyed if it is not metal or soft rubber. Where there is not much pus or infection it can be washed, immersed in antiseptic solutions, and steamed internally.

A Device for Washing out the Pelvis of the Kidney Through the Ureter.—By an ingenious combination of instruments already in every armamentarium, TUCKERMAN (*Clev. Med. Gaz.*, June, 1899) has been able to irrigate the pelvis of the kidney and the ureters through a Kelly speculum. The method is described as follows: "This device consists of a No. 6 French catheter, an ounce bulb, and the common exploring aspirator, with the ordinary three-way stop-cock, all connected by rubber tubing. The catheter is introduced in the ordinary manner through the Kelly speculum. It is necessary to use a stylet in the catheter, passing the catheter up as far as possible without force, then withdrawing the stylet a couple of inches, passing the catheter further, and so on, until the pelvis of the kidney is reached, then, by exhausting, the contents of the pelvis of the kidney can be drawn into the bulb and inspected. From the amount of fluid which is drawn into the bulb we may judge of the capacity of the pelvis of the kidney. If pus be present, and it be deemed advisable to wash out the kidney, the bulb can be detached from the catheter, filled with boric-acid solution, or such other disinfecting fluid as the practitioner may desire, and, by reconnecting and reversing the stop-cock, the fluid can be injected into the pelvis of the kidney, again withdrawn, new fluid reinjected and withdrawn, until, as in washing other cavities, the fluid comes away clear. Then, if it be desirable to medicate the pelvis of the kidney, the bulb can be filled with the proper quantity of medicament, which in its turn is forced into the pelvis of the kidney, where it is left by the withdrawal of the catheter."

The author has used this device with success. He has dilated the stricture of the ureter in three sittings up to No. 8 French, washed out the pelvis, and decreased its capacity by relieving it of the pus which it contained.

Post-anæsthetic Paralyses.—MALLY (*Rev. de Chir.*, July, 1899) cites a number of instances in which paralyses central, hysterical, peripheral, or reflex, have been detected after the administration of a general anæsthetic.

Regarding the peripheral paralyses, he says they are generally due to compression. They are more numerous than one might at first suppose, as many of them pass unnoticed, the patient recovering before being able to leave the bed after the operation, so that they are not noticed. If, however, they are carefully questioned, many will admit that they have had a numbness or tingling which has not amounted to much. The anæsthetic cannot be considered as the cause of this, except that the unconscious patient has been unable to defend himself against cramped positions and overstretched limbs.

The paralyses that are reflex and those that are hysterical in their character have nothing to do with the anæsthetic. The central paralysis due to cerebral hemorrhage are very rare where the anæsthetic has provoked the arterial rupture in a purely mechanical manner.

The treatment should be preventive, sufficient care being exercised to prevent the patient from receiving injury by pressure through awkward positions during the operation. The cerebral and hysterical should be treated on principles applicable to these conditions. The use of electricity and massage is advised for the others.

PEDIATRICS.

UNDER THE CHARGE OF

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AND

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X-Ray Examinations in Children.—FRANCIS H. WILLIAMS (*Boston Medical and Surgical Journal*, July 13, 1899, p. 41) confirms his earlier opinion of the value of X-ray examinations in young patients. Children and infants are more easily penetrated by the rays than adults, and, like older persons, may be readily examined without removing the clothing, as they lie on the stretcher in front of the apparatus. Infants often go to sleep while on the stretcher, and may be then examined with the fluorescent screen, or an X-ray photograph may be taken without disturbing them. Thorax, abdomen, and head are all more accessible to this method of examination in children than in adults. In examining the thorax, indeed, care must be taken to avoid too much light, for the organs in the chest of a young child are so easily traversed by the rays.

In some cases of pneumonia, especially in the early stages, where physical signs are vague, a doubtful diagnosis may be made more certain by an X-ray examination. The author mentions a case in point of a child six years old, admitted to his ward with high fever, leucocytosis, pain and stiffness in the back of the head and neck, the neck being so rigid it could not be flexed. There was no history and no physical signs were found in the chest by three physicians who examined him. An X-ray examination revealed a dark area over one lobe, and a shortened excursion of the diaphragm on that side; a diagnosis of pneumonia was made without hesitation. This was confirmed by a marked crisis and a rapid clearing of the lung as determined by X-ray examinations. At no time during the course of the disease were the signs of consolidation obtained by auscultation and percussion.

In cases of suspected tuberculous meningitis a careful X-ray examination of the lungs will be of value in determining the presence of tuberculous foci therein.

In pleurisy, with effusion or empyema, the X-rays assist greatly in diagnosis, any condition of the lung making it less penetrable to the rays, or a change in the excursus of the diaphragm, or changes in the size, position, or shape of the heart being easily demonstrable.

The size and position of the liver and spleen are more readily determined in children than in adults; likewise the size and position of the kidneys, especially the left one.

The size of the stomach may be determined after giving subnitrate of bismuth with bread and milk.

The author has made about 3000 examinations, and has never had any untoward effects.

Pathological Anatomy of Acute Anterior Poliomyelitis.—HAGENBACH-BURCKHARDT (*Jahrbuch f. Kinderheilkunde*, 1899, Bd. xlix., S. 112) reports the post-mortem findings in a case of acute poliomyelitis consecutive to a burn. The patient was a boy, aged eleven months, who sustained a burn of the second degree upon the forehead from hot coffee. The next day he had vomiting, followed on the succeeding day by fever, chills, loss of power in the arms and legs, and could not sit up nor hold up the head. The patellar and cremasteric reflexes were abolished. There was no ocular disturbance and no involvement of the face. Sensation appeared to be preserved. Respiration was frequent and superficial; the urine scanty, infrequently passed, and containing a little sugar, but no albumin. The temperature varied from normal to 101°, the pulse from 150 to 200. The child died on the fourth day, dyspnœic and cyanosed.

The diagnosis of poliomyelitis was verified at autopsy. There were multiple foci in the cervical and lumbar region of the cord, the gray substance being softened, and, in some foci, hemorrhagic.

Microscopically there was observed fatty degeneration of neurogliar cells, cellular infiltration of vessel-walls, hypertrophy of axis-cylinders, and disseminated hemorrhages. The greatest intensity of these lesions appeared in the lumbar region and in the left anterior horn of the dorsal cord.

The Presence of the Klebs-Löffler Bacilli in the Air of a Diphtheria Ward.—H. RICHARDIÈRE and L. TOLLEMER (*Gazette des Maladies Infantiles*, 1899, No. 10) have made an interesting series of experiments to discover whether bacilli were present in the air of apartments devoted exclusively to the treatment of diphtheria patients before and after disinfection had been practised. These observations were made in the Bretonneau pavilion of the Hôpital Trousseau.

In the first series of experiments the wards had not been disinfected for several weeks. They contained about thirteen diphtheria cases. Two procedures were adopted: in the first the air of the rooms was driven over sterilized bouillon; in the second, Petri dishes containing coagulated beef serum were exposed to the air for varying periods of time. Bacteriological tests were controlled by inoculation of animals. Similar experiments were also made in apartments which had been occupied by diphtheria patients, but had subsequently been disinfected.

The result of these observations showed that virulent diphtheria bacilli were present in the dust floating in the air of the Pavilion Bretonneau, which had not been disinfected for a long time, but that they were absent after disinfection. These experiments, therefore, show the importance of frequent disinfection of wards devoted to contagious cases and the necessity for the precautions of rigid isolation which are carried out in these wards at the present time. They show, also, that it is necessary to employ daily some means of removing, without at the same time stirring up, the dust of such apartments.

Rhinitis Externa Due to the Bacillus of Löffler in Children Convalescent from Scarlatina.—TODD (*Lancet*, May 28, 1898) has found in 365 children convalescent from scarlatina, examined during a period of eighteen months, that 51, or 14 per cent., presented a rhinitis externa due to the bacillus of Löffler, which was virulent for guinea-pigs. The affection was contagious. There was no false membrane, but the nasal mucosa was red, swollen, and easily ulcerated. In many of the cases there was scattered over the body a secondary eruption of pustules, containing at first the Löffler bacillus and later staphylococci. In no instance was the diphtheria bacillus found in the throat or in the posterior nares; there was no angina or croup, no glandular swelling, elevation of temperature, nor albuminuria. Beside these microbes there were varieties of staphylococci, and rarely streptococci.

Lumbar Puncture followed by Relief of Symptoms.—J. MADISON TAYLOR (*Therapeutic Gazette*, April 15, 1899) records four cases of meningitis, with symptoms of acute hydrocephalus, in which withdrawal of cerebro-spinal fluid by lumbar puncture was followed by more or less improvement, with saving of life in three of them. The first case, in a boy of two and a half years, was reported as one of chronic leptomeningitis, with purulent otitis media. Two punctures were made about a month apart, 35 and 41 c.cm. of fluid being drawn off. Marked improvement continued as long as the child remained under treatment. Case II. is described as one of acute hydrocephalus, with rapid aggravation of symptoms, in a boy, eight months old. Thirty c.cm. of fluid were withdrawn. Several hours later it was noted that there was marked lessening of the tension in the fontanelle; that the pupils, which had been irregularly dilated and irresponsive to light, now responded to the light stimulus, and seemed almost normal; that the pulse had become steady, and that spasmodic movements had decreased. The child has remained under observation for over a year, and is very well except for a slight condition of hydrocephalic deformity. Case III. was reported at length by Dr. Edwin Rosenthal in *Pediatrics*, November 1, 1897, and is referred to in abstract. It is described as acute hydrocephalus. Eighty c.cm. of fluid were removed, in which no tubercle bacilli were found. Temporary relief followed, but after twenty-four hours the severe symptoms recurred, and the child died of exhaustion six days later. Case IV., in an infant of seven months, was probably one of simple posterior basic meningitis, characterized by convergent strabismus, general convulsions, retraction of the head, etc. Ten c.cm. of fluid were withdrawn, in which no bacilli were found. Pressure symptoms were at once relieved. After four months' observation the child seemed to be perfectly well.

Infectious Icterus in Childhood.—KISSEL (*Jahrbuch f. Kinderheilkunde*, Bd. xlviii., S. 235) presents a study under this title based upon ninety-six cases observed in children from one to thirteen years of age. Twenty-two are reported in detail. In none of the series has it been possible to establish a precise etiology; the children presented no special feature in their development or in their state of nutrition; they were not particularly subject to gastro-intestinal affections. The onset was sometimes insidious, but usually was sudden and accompanied by fever, headache, and chills. Jaundice appeared ordinarily on the third or fourth day, sometimes at the end of a week. The urine became highly colored; the stools pale. In only three cases did the urine contain a small amount of albumin. The liver and spleen were ordinarily increased in volume and were painful to pressure. Slowing of the pulse was noted in only three cases. Temperature was usually elevated during the first three or four days. The duration was three or four weeks. Of the ninety-six cases six died, all of them with symptoms of cholæmia.

Cardiac Murmurs without Organic Lesions in the Eruptive Fevers, Particularly Scarlatina.—L. D'ANFREVILLE DE JUSQUET DE LA SALLE (*Thèse de Paris*, 1898), in a thesis devoted to this subject, refers to the frequency with which inorganic murmurs are encountered in the eruptive fevers, especially during the convalescence from scarlatina. They are observed more frequently in females, with whom the proportion reaches 66 per cent., and more commonly between the ages of fifteen and twenty-five years than with the very young or old. Those of feeble constitution, or those who have had previous cardiac affections, seem to be predisposed. These murmurs have no importance as regards the duration, course, or termination of the disease.

While adopting the rules formulated by Prof. Patin for diagnosticating such murmurs, the author criticises and rejects the cardio-pulmonary theory of their origin. He regards them as due to myocarditis, producing a diminution of tonicity of the cardiac muscles or disturbances of its innervation. Either microbic toxins or exhaustion of the heart may be at the root of the trouble.

The density of blood of such patients does not seem to be inferior to that of the average case.

In closing, the author concludes, from his own experience, that digitalis and caffeine seem to act favorably upon these organic murmurs, while vaso-dilators, bromide of potassium, iodide of sodium, and nitroglycerin tend to increase them, and vaso-constrictors appear to have no effect at all.

THERAPEUTICS.

UNDER THE CHARGE OF

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The Neutralizing Power of Calmette's Antivenomous Serum: Its Value in the Treatment of Snake-bite.—DRS. W. SEMPLE and G. LAMB assume, from experiments, that 15,432 grains of antivenomous serum will neutralize

0.015432 grain of cobra venom, and therefore 225 grains of serum would be required for this amount of venom. When snake-bite is treated, soon after it occurs, with an intravenous injection of antivenomous serum, the authors show by experiment that the result is the same as that obtained when done in glass vessels in the laboratory. Disregarding cases where death occurs very rapidly (probably the venom is injected directly into a vein), death usually occurs after several hours. During the interval the poison is gradually absorbed. If 225 grains or more of antivenomous serum be introduced into the blood, before the lapse of such time as is required for the absorption of a lethal dose of the venom, recovery should take place.—*The British Medical Journal*, 1899, No. 1996, p. 781.

On the Use of Diphtheria Antitoxin in General Practice.—DR. J. R. ARMSTRONG sums up abstracts from the cases of a number of patients, some of whom were treated with antitoxin, others not. He concludes that where the antitoxin was used (although only for patients who were very seriously ill) recovery was much more rapid. The throat symptoms cleared up in half the time. The average time for the membrane to disappear from the throat is two and three-quarter days. In non-injected patients five and two-third days elapse, on an average, from the commencement of treatment. Disappearance of the membrane in both methods of treatment marks a distinct improvement in the patient's condition. In the patients treated with antitoxin convalescence has practically begun, while in non-injected patients signs of weak heart action continue for some time longer. The former are up and about during the second week; the latter remain ill several weeks longer. The mortality in the former was 9 per cent., and in the latter, who were mildly affected, 20 per cent. Antitoxin is to be used in all except the very mildest attacks of diphtheria. The author compares the results obtained in his own practice, mortality averaging 3¾ per cent., with that in the practice of others not using the antitoxin so freely, with a death-rate of 17½ per cent., and deduces that antitoxin is not so frequently used as it should be. Fifteen hundred units—the liquid and not the dried serum being used—is injected under the skin of the abdomen. Very infrequently a second injection is required after an interval of two or three days. The indication for repetition being absence of improved general condition and continued presence of the membrane after three or four days, option should be given every patient as to injection in very mild attacks, and in all but these injections should be insisted on. Perchloride of iron, acetate of ammonia, and brandy should also be given internally.—*The Lancet*, 1899, p. 574.

Complications of the Serum Treatment of Diphtheria.—DR. CHARLES BOLTON believes the blood-serum to be responsible for the rashes, pains, and fever, for these occur whether the horse from which the serum is taken be immunized or not. Large and multiple doses increase the frequency of the rashes. Adults are more liable to severe pain than children. The severity of the attack of diphtheria and the day of the disease on which antitoxin is administered do not affect the rashes and pains. The rashes are of two kinds, often occurring together—urticarial and erythematous. The latter are divided into four sub-groups: (1) Resembling erythema multiforme.

(2) Simple erythema. (3) Scarlatiniform. (4) Morbilliform. The scarlatiniform rash appears much earlier than the morbilliform eruption, corresponding with the periods of incubation of scarlet fever and measles. All forms of rashes have their beginning, apparently, in the vicinity of the injection, and are more marked in this region. When joints and adjacent tissues are painful there may be slight swelling, but it is exceptional to find fluid, and the overlying skin is usually normal. Acute rheumatism is simulated, the condition lasting four days. Hips, knees, wrists, and hands are most commonly affected. The rash usually appears first, and the pain subsequently. Rise of temperature is most frequent when the rash and pain are both present; it rarely occurs when there is pain only. Enlarged glands and otitis media often accompany the febrile movement. The temperature-curve is irregular, varying between 100° and 105° F.; it is especially high when pain is present, and with the morbilliform rash. Albuminuria was found in about 50 per cent. of the cases. The amount was small, and it was present a short time only. Abscess at the seat of injection is due to injection through the needle; it is more frequent in septic cases and where scarlet fever is present. Healing quickly follows incision. Bruising of the tissue is present in 8 per cent. of the cases; it lasts from four to seven days. Sloughing occurred in one fatal case. Constitutional disturbances consist in rigors, convulsions, and rise of temperature; somewhat later rashes may appear. The author considers the complications of antitoxin treatment very painful at times, but quite harmless.—*The Lancet*, 1899, p. 891.

The Etiology and Treatment of Neurasthenia.—DRS. J. COLLINS and C. PHILLIPS recommend prophylaxis against the development of this disorder. The offspring of neurotic parents are to be reared with extraordinary care. An attack having once occurred, another is always likely to follow. The individual's life-habits are to be studied and regulated. Though the physical element plays a large part in an attack of neurasthenia, still it is largely the mind of the patient that requires treatment. Psychical treatment consists in obtaining the confidence of the patient, and suggestion is often invaluable. Added to these are:

1. Hygiene, including dietetics. 2. Hydriatic measures. 3. Electricity, rest, exercise, and massage. 4. Climato-therapy. A proper amount of sleep is insisted on. Often neurasthenic patients will already have used hypnotics until they no longer react. Coupled with hydriatic measures, etc., sleep can be produced. Isolation, either complete or partial, is recommended under general hygiene. Where the patient dwells mainly on the condition of his viscera, it is wise not to lay any stress on his dietary, but to suggest wholesome food and the use of coarse, green vegetables, together with plenty of water to drink, large movements thereby resulting. Patients should be assured that no organic or irremediable condition is present. Mixed diet, as a rule, is preferable. When milk is tolerated it should be added to the regular diet. It is best given a half-hour before or two hours after a meal. Frequent feedings are also serviceable. Stimulants in general are to be forbidden or not, depending on the patient's habit and how he reacts to them. If there be any connection between any stimulant and the development of the neurasthenia, its use is to be stopped at once. Hyperchlorhydia

is to be treated by regulation of the diet, reduction in the amount of animal proteids ingested, and increased quantities of vegetable proteids and easily digested starches; also milk, with an alkali, is indicated. Where lavage has become a habit it is decidedly injurious, and should be stopped. Constipation is very often present, and is due to sluggish peristalsis and insufficient water; and strychnine and belladonna, with abdominal massage, are indicated. High oil enemata are recommended. The authors prefer the simple douche and cold pack among hydriatric measures. Electricity is of less value than water in treatment; the kind used is of little importance; its beneficial action is largely psychic. Climato-therapy amounts to little. Improvement is more often due to change of surroundings than to climatic conditions. "Travelling for health" is considered detrimental in the large majority of instances. Medication is often to be prohibited instead of prescribed. Treatment in sanatoria provided with hydriatric and other equipment has little in its favor. It is inimical to individualization, and is rarely of value.—*The Medical Record*, 1899, vol. lv. p. 413.

Benzine in Anæsthetic Mixtures.—DR. HORATIO C. WOOD, JR., records his experiments to determine the correctness or falsity of the statement that benzine serves as a "nearly inert" diluent in anæsthetic mixtures, and, indirectly, the advisability of further clinical trials of it. Benzine, or petroleum-ether, is not a definite chemical compound, but a mechanical mixture of several hydrocarbons of the marsh-gas series, its specific gravity and boiling-point differing, within certain limits, according to the predominance of pentane or hexane. He shows definitely that it is by no means devoid of toxic properties. As its anæsthetic action is a very feeble one in comparison with its effect on the respiratory centre, it is to be expected that the use of it as a "diluent" in anæsthetic mixtures must increase their action on the vital functions more than on the sensory system, and, therefore, render them more dangerous. The advantages claimed for these new anæsthetic mixtures are less excitement, it is more pleasant to take, it has greater rapidity of action, and is cheaper—in other words, much the same advantage that chloroform has over ether. When, however, we study those symptoms, giving us an indication of the relative danger of the mixture, we find, first, that the percentage of instances of cyanosis is rather high. Again, several observers have noted that the respiration often stopped suddenly without previous warning, and one or two have observed sudden collapses. Several instances of bronchopneumonia (one fatal) have been noted. Most observers failed to find any signs of subsequent nephritis, but albuminuria does occasionally occur. Vomiting seems to be about the same as after ether.—*Philadelphia Medical Journal*, 1899, vol. iii. p. 843.

Antipyrine in Menstrual Epilepsy.—DOTT. WIESE FRANCINI had treated a patient with the three bromides without result. Commencing a few days before the expected period, three or four times daily a powder containing five grains of antipyrine and two grains of sodium bicarbonate was administered. For the first time in five years this period passed without symptoms. The continuance of this treatment at subsequent periods was successful.—*Gazetta degli Ospedali e delle Cliniche*, 1899, No. 34, p. 367.

Spinal Elongation in the Treatment of Tabes Dorsalis.—DR. JEAN LECLERC describes an apparatus in use at the Salpêtrière for temporarily lengthening the spine. Based on the fact that stretching the sciatic nerves results in an altered blood-supply to the lower part of the spinal cord, the attempt is made, by mechanically elongating the spine, directly to attain the same result in the region of the posterior columns undergoing sclerosis. Suspension of the body simply is sufficient, as is shown by the persistence of curvatures of the spine. By this apparatus curvatures are noticeably diminished, and the spine is literally stretched. This is true of the whole length of the spine. There is frequently an abnormal laxity in the articulations, the nerve-trunks become adapted to the increased movement of the joints; they elongate and permit the lower part of the spinal cord to ascend in the canal, without itself being properly elongated. Therefore, hyperextension of the legs is added, the patient being placed on an inclined plane. The apparatus is complicated. Elongation by cervical traction usually gives good results; sometimes headache follows, and scapulo-dorsal traction is substituted. Dragging sensations in the spine and extremities prove the reality of elongation. Pulse and respiration are normal; there is no facial congestion and no increase of arterial tension. Elongation should be practised every two days; more frequently used it is harmful. Average duration is ten minutes, but at first three minutes suffice. Contraindications: Disease of the heart and vessels; aneurism, emphysema, cachexia, and laryngeal crises. In abnormal spinal rigidity or laxity, and in obesity, success is more doubtful. In all stages of tabes, if none of the above complications are present, much improvement follows, "elongation" acting remarkably well in disorders of sensory nerves, both superficial and deep. Theories of how elongation of the cord acts beneficially are: Altered blood-supply, meningeal or neurogliar rupture, and stretching of the nerve-sheaths. None of these have been demonstrated. Results of treatment are: Improved general condition, the pain diminishes, crises are of short duration. Painful phenomena of the second stage of tabes, except crises, are not much improved. Retention of urine is cured in a short time. Incontinence is often much improved, but more slowly. It is sometimes wholly cured. Seminal losses are unaffected, but impotence is entirely cured and coitus rendered possible after a month of treatment. Motor inco-ordination is much improved, the result being more satisfactory than that obtained by teaching the patient to guide his movements by vision. Gastric crises in one patient were entirely cured. In another they were much reduced, both in frequency and intensity, one attack occurring every third day instead of fifteen daily. Improvement is to be looked for after fifteen or twenty elongations. If there be no change after forty applications it is useless to continue longer. Treatment is indicated while there is either superficial or deep sensory disturbance. Four months of treatment are to be followed by one or two of rest; another period of treatment is to follow.

Painful symptoms can thus be made to disappear wholly in some patients, the Argyll-Robertson pupil and Westphal's symptoms alone remaining. The author maintains that such a patient is functionally cured.—*Revue de Thérapeutique*, 1899, No. 7, p. 221.

The Therapeutic Value of Paraldehyde.—DR. JOHN V. SHOEMAKER states that beside producing sleep this remedy serves several other important purposes. Restlessness, agitation, and dyspnœa are markedly diminished under its influence. The headache, frequently combined with the symptoms mentioned, will often yield to this remedy. In its elimination by the lungs it exerts a beneficial action upon the respiratory passages, improving the character of the secretions and discharges, tranquillizing the action of the muscles of the chest and restoring the normal rhythm. From this association of properties this remedy is beneficial in insomnia, whether of the simple variety or that dependent upon organic disease. It is advantageous in chronic bronchitis, asthma, dyspnœa of the functional variety, or that due to disease of the heart, lungs, or kidneys. In some convulsive disorders decidedly good results have been reported.—*Merck's Archives*, 1899, No. 3, p. 181.

DR. WILLIAM MACKIE first used the drug for spasmodic asthma, and finds it also very serviceable in both functional respiratory troubles and dyspnœa arising from various causes, even when complicated by grave organic lesions. Paraldehyde, if continually exhibited, loses its power, but not so rapidly as do many other drugs of the same class. The best method of giving the drug is with an equal amount of syrup of orange-peel or syrup of humidesmus, freely diluted with water. In the presence of tinctures it becomes fairly miscible in water.—*The Lancet*, 1899, p. 756.

The Therapeutics of Heat and Light, and Electric Heat and Light Baths.—DR. H. L. JONES speaks of a paper by Winternitz describing electric light baths. A wooden cabinet is arranged for the reception of the patient's body. Within are incandescent lamps and reflectors. The patient is subjected to both the light and heat from the lamps. This cabinet has been found useful in the treatment of rheumatism, asthma, anæmia, neurasthenia, and obesity. The rapidity with which diaphoresis (within five minutes) follows entrance into the cabinet is considered of importance. The temperature is only 81° F. The radiant heat penetrates the tissues more deeply, the effect is more stimulant, perspiration is more quickly induced, and the air about the patient is comparatively cool; these are the advantages of this apparatus over the ordinary hot-air bath. Whether the electric light rays play any part is unknown. Indications for the use of this method are the same as for the older ways of applying warmth. Radiant (electric) heat has probably no special therapeutic value which the older methods do not possess. Incandescent lamps are the quickest and cheapest of thermal generators. Workmen in the vicinity of arc lights are apt to suffer from effects much like sunburn; these effects are due to light and not to heat. Anæmia, especially, because occurring so often in patients deprived of sufficient light, might be benefited by a systematic course of treatment with the light of the electric arc. The arc light, either by the emission of ozone or by its light, is a powerful deodorizer of noxious smells.—*The British Medical Journal*, 1899, No. 1994, p. 658.

Ice or Heat as a Local Application.—DR. W. EWART recommends ice-massage in rheumatoid arthritis and allied conditions. Relief of pain is immediate, and lasts for a considerable time. From the writings of Arnott

(1864) the author quotes successes with freezing mixtures of ice and salt, the pain of sciatica, lumbago, and neuralgia being invariably relieved. Ice-massage is equally efficacious and free from danger. Pleuritic pain accompanying pneumonia of the base is immediately relieved for several hours. The systematic use of the spinal ice-bag is recommended in chronic rheumatism and lumbago. Recently functional aphonia has been cured by freezing the skin with methyl chloride over the spot where the superior laryngeal nerve sends an internal branch to the larynx. Laryngismus stridulus, spastic aphonia, and in the laryngeal crisis of tabes it is also serviceable. Neuralgia and peripheral neuritis are also improved. The linear application of extreme cold (stypage) can be used for relief of neuralgia.—*The Lancet*, 1899, p. 957.

Syphilis Treated by the Intravenous Injection of the Mercury Cyanide.—MR. A. CHOPPING makes the following claims for this method: 1. The patient is under daily observation. 2. The exact amount of the drug introduced is known. 3. Rapidity with which the effect of the drug is produced and serious lesions disappear. It is particularly of use when other methods have failed. Of eighty-four thus treated all but one showed very marked improvement. Adjuvants were cod-liver oil, iron, and hygiene. In the tertiary stage and in patients showing rupia, iodides of sodium and ammonium were used. The writer thinks there is little risk attending this method. Ordinary asepsis is to be practised. The veins of the forearm are preferable, a rubber tourniquet being applied to the upper part of the arm. Twenty minims of a 1 per cent. solution of the cyanide of mercury are introduced in the direction of the blood stream. A typical sensation is imparted to the fingers when the needle has entered the vein. The tourniquet is removed and the injection made. It is to be repeated daily unless diarrhœa results, and this rarely occurs. The injection is painless unless the vein is missed, when acute swelling and pain follow. These latter will yield to hot fomentations, though sometimes persisting for several weeks. Bruising of tissues around the vein can be overcome by using a pine needle.—*The Lancet*, 1899, p. 432.

Cantharides in Chronic Parenchymatous Nephritis.—DR. JULIUS SALINGER believes this drug to have distinct curative powers, as well as being valuable as a diuretic in nephritis. The tincture is the best preparation, and is to be given in small doses (one or two minims), as an overdose is easily irritating to the renal epithelium. In two cases quoted at length, dropsy and marked oliguria were speedily benefited and cured. The following prescription was found satisfactory: Iron and ammonium acetate, half an ounce and tincture of cantharides, two minims.—*The Therapeutic Gazette*, 1899, vol. xxiii. p. 295.

A Note on Sparteine Sulphate.—DR. P. M. CHAPMAN believes that in certain selected cases, chiefly those characterized by cardiac dilatation, arising so far as we know by an accumulation of residual blood, this drug is invaluable. The dose should be one-half to one grain every four hours. A slight purgative action, and most frequently an increase in the urine follows, and thus the drug may be called a mild hydragogue diuretic.—*The Birmingham Medical Review*, 1899, vol. xlv. p. 279.

GYNECOLOGY.

UNDER THE CHARGE OF

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Effect of Intra-uterine Injections on the Ovaries.—GRAMMATIKATI (*Vratch, La Gynécologie*, April, 1899) bases the conclusions in this communication upon a case in which 115 intra-uterine injections were given in the course of three months, during which time menstruation was suppressed. At the end of this period the tubes and ovaries were removed. The ovaries were generally anæmic, contained but few primordial follicles, and their tissues were poor in cells—in short, there was no indication of functional activity.

The writer infers that injections exercise an inhibitory action on ovolution. In the case reported the solution consisted of 45 grains of alumnol in 3 ounces each of alcohol and tincture of iodine. No unpleasant symptoms followed the daily treatment.

Curettement in Ectopic Gestation.—SMOLSXY (*Ibid.*) opposes Nyder's recommendation to employ diagnostic curettement in cases of suspected tubal pregnancy, on the ground that the results of the microscopical examination of the tissue removed are not positive, and may lead to erroneous conclusions. He reports a case in which he used the curette three days after pseudodecidual membrane was expelled, and was unable to find any trace of decidual cells, the only change being occasional glandular hypertrophy. Ten days later the gravid left tube was removed by abdominal section. A microscopical examination of the membrane expelled showed the large decidual cells, with absence of uterine glands and chorionic villi, regarded by Abel as characteristic of ectopic gestation. But if Nyder's conclusions were correct, it would have been inferred that the tumor palpated on the left side of the uterus was *not* a gravid tube, as it proved to be.

Intermenstrual Pain.—FASSINA (*Thèse de Paris;* abstract in *La Gynécologie*, April, 1899) observed that certain women suffered from recurrent attacks of pain at a definite time between the menstrual periods—from twelve to fifteen days after the last menstruation. The pain was situated either in the ovarian or hypogastric region, and was accompanied by an aqueous or sanguineous discharge, the phenomena lasting two or three days, being rarely prolonged until the next period. The attacks were always acute, but the pain was unlike that of either salpingo-oöphoritis, pelvic peritonitis, or oöphoralgia. The exact cause of the intermenstrual pains is not clear. Whether they represent a recurrent process of ovulation or a supernumerary menstruation, there must be a sudden congestion of the ovary, leading to vasomotor disturbances of the uterus, as shown by the mucous or bloody discharge. Slight lesions of the ovary in neurotic subjects are doubtless the main factors in the production of the intermenstrual crises.

Treatment of Inoperable Carcinoma of the Cervix Uteri.—GOTTSCHALK (*Centralblatt für Gynäkologie*, 1899, No. 3) commends the following method of treating inoperable cancer of the cervix: After thorough cauterization of the ulcerated surface, a circular incision is made with the Paquelin cautery in healthy vaginal tissue, and the cuff thus formed is turned downward over the diseased area and kept in contact with it by a gauze tampon, which is left in situ for a week. A cicatrix results, which occludes the vagina transversely and resists the invasion of the disease for five or six months, during which time the patient remains free from hemorrhage and foul discharge.

Preservation of the Ovaries After Hysteromyomectomy.—WERTH (*Centralblatt für Gynäkologie*, 1899, No. 22) opposes Abel's view that there is such an intimate trophic relation between the ovaries and the corpus uteri that there is no object in pressing the former in cases of laparomyomotomy unless a portion of the body of the uterus is left. He reports seventeen cases, six of which had been under observation for over three years, in twelve of which at least a portion of one ovary was saved. Twelve patients were free from the usual climacteric disturbances following the operation, although in every instance the uterus was amputated at or below the level of the os internum.

In order to insure sufficient blood-supply to the ovary, the writer advises against the employment of mass-ligatures, and recommends that the gland be sutured to the stump of the uterus with the peritoneum. In one instance in which the spermatic vein was ligated hemorrhagic infarctions were afterward found in the ovary. In the case of a patient who died of pulmonary embolism four weeks after operation, the establishment of a free collateral circulation to the ovary was demonstrated.

FRITSCH (*Ibid.*), on the contrary, always removes the ovaries, believing that post-operative nervous disturbances are inevitable in certain subjects, and that it is exceptional for these to be severe.

If an ovary be left there is danger of the formation of adhesions and of degeneration of the gland, on account of interference with its vascular supply —both of which results he has observed in the course of secondary operations.

Steam in the Treatment of Uterine Hemorrhage.—DÜHRSSEN (*Berliner klin. Wochenschrift*, 1898, No. 36) reports the following cases:

Case I.—The patient, aged thirty-seven years, had been exhausted by profuse and persistent menorrhagia. Steam was introduced into the uterine cavity for two minutes. Nine days later a cast was thrown off, consisting of the endometrium and subjacent muscular layer. Three weeks later the steam was used again for one minute and a half. As a result, the uterus underwent complete atrophy.

Case II.—The patient had flowed almost daily for four years, having been curetted four times and received various local applications, without result. Steam was used for two minutes, the usual slough following. The patient menstruated twice during the next three months; the uterus then atrophied, and its cavity became obliterated.

In a third case, amenorrhœa persisted for six months after the treatment, the uterine cavity being presumably obliterated. In the fourth hemorrhage was due to a small fibroid, curettement being employed without benefit.

Bleeding, which had persisted for over three weeks, ceased after vaporization had been used for one minute. At the end of nine weeks the patient had a scanty menstrual flow, the uterine cavity being much diminished.

In consequence of his experience in these cases the writer advises that in young women the vaporization be employed not over fifteen seconds, not being repeated until after the next menstruation. The cervix should be dilated beforehand, and care be exercised to surround the steam-pipe with a non-conductor, to avoid cauterizing the tissue. He has also found this method of treatment useful in septic and gonorrhœal endometritis, provided that the rule is observed of not allowing the steam to escape for more than a quarter of a minute.

Ultimate Results of Castration for Fibromyoma.—Winternitz (*Ibid.*) quotes Saexinger's statistics, including fifty-one operations with eight deaths. Thirty-nine patients were kept under observation during periods varying from three to sixteen years; of these both ovaries had been entirely removed in all but three.

In 88.8 per cent. the hemorrhages entirely ceased; in 83.3 per cent. the tumor certainly diminished in size. In three cases only did it continue to enlarge, twice on account of sarcomatous and once from cystic degeneration.

In spite of these favorable results, the writer thinks that castration cannot be compared with the radical operation, the mortality of the latter being as low as 2 per cent. in some hands. The palliative operation should accordingly be reserved for a limited class of cases in which, on account of the condition of the patient or the anatomical conditions, removal of the uterus would be attended with too great risk.

Changes in the Endometrium in Fibroid Uteri.—Barremans (*Revue Internat. de Méd. et de Chir.*, 1899, No. 6) does not agree entirely with those pathologists who affirm that fibromyomata are usually accompanied by glandular endometritis. He has found that while the deeper layers of tissue show a glandular change, the more superficial present the microscopical appearances of an interstitial endometritis. Under increased blood-pressure, or venous obstruction, the vessels may rupture when the glands in the deeper layer are found to contain blood-corpuscles and coagula. The glands invade the subjacent muscular layer, and may even invade the myoma.

This hyperplastic form of endometritis is the rule; the mucosa is seldom atrophied except when it is strongly compressed by fibromyomatous nodules.

Effect of Castration on Growth of Bone.—Sellheim (*Centralblatt für Gynäkologie*, 1899, No. 23), from experiments on various young mammals, found that after removal of the ovaries the growth of the long bones was retarded and the pelvic diameters became distended. The bones of the skull remained soft, and these sutures did not unite.

Transplantation of the Ovaries.—Ribbert (*Archiv für Entwicklungsmechanik der Organismen*; *Centralblatt für Gynäkologie*, 1899, No. 23), in experimenting with guinea-pigs, found that within thirty days after transplanting ovaries to the uterine cornua or broad ligaments, the tunica albuginea and germ epithelium were nourished directly from the peritoneum; so that the primordial follicles retained their normal appearance. On the other hand, the struma, with the larger follicles, was destroyed, its place being taken by a new growth of connective tissue derived from the peritoneum.

Contrary to Arendt's observations, he found that progressive changes took place in the transplanted gland, the primordial follicles maturing and encroaching upon the struma more actively than in the normally situated ovary. When examined after an interval of three months, instead of atrophy taking place, there was an actual increase in the development of the ova.

Treatment of Stenosis of the Cervical Canal.—Several articles on this well-known theme have appeared during the past year. CHABRY (*Revue de Gyn. et de Chir. Abdom.*, 1899, No. 3) reports several cases in which Pozzi's discission and plastic operation was performed, with the following results: All the cases of dysmenorrhœa and cervical endometritis were cured; five women out of fifteen became pregnant, pregnancy and labor being free from complications; the os externum and cervical canal remained permanently normal.

BARONE (*Arch. di Ost. e Gin. Centralblatt für Gynäkalogie*, 1899, No. 18) believes that divulsion is an imperfect operation; he prefers Sims' method of discission, because the results are more permanent. Of ten patients upon whom this operation was performed five became pregnant.

PETRI (Inaugural thesis: abstract in *Centralblatt für Gynäkologie*, 1899, No. 18) reports thirty-two cases of discission of the cervix for stenosis by Glaevecke, with twenty-one patients cured and eight relieved. A glass drain was always used. Parametritis occurred in two cases and crural phlegmasia in one. Three patients conceived (one in the tube), one patient being delivered at term. No return of the stenosis was noted after three years.

Relation between Biliary Colic and the Uterine Functions.—CARNILLON (*Rassegna di Ost. e Gin.; Centralblatt für Gynäkologie*, 1899, No. 18) calls attention to the fact that attacks of biliary colic often occur at the beginning of the menstrual period; when the attacks are frequent and long-continued the period is often irregular, even when the pelvic organs are quite normal. At the approach of the climacteric the attacks may return, with increased severity, being sometimes attended with menorrhagia. During pregnancy they often cease, to return with the first period, or after lactation has been suspended.

Colicky attacks may be induced by operations on the uterus or adnexa, even in cases in which the patient has had no previous history of gallstones.

The Ovaries in Osteomalacia.—BULINS (*Beiträge zur Geb. u. Gyn.*, Band i., Heft 1) describes the microscopical changes in six ovaries removed from patients with osteomalacia. Nothing distinctive was found, nor were the changes constant, being chiefly the usual hyalin degeneration, vascular dilatation, etc. The writer infers that no conclusions with regard to the origin of osteomalacia can be drawn from an examination of the ovaries; in fact, the etiology of the disease is still obscure.

OBSTETRICS.

UNDER THE CHARGE OF

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Pregnancy Complicated by Ovarian Cysts.—In the *Monatschrift für Geburtshülfe und Gynäkologie*, 1899, Band ix, Heft 4, BRAUN reports two interesting cases of pregnancy complicated by ovarian cysts.

The first was that of a woman, aged thirty-three years, who had borne children, but with difficulty. The use of forceps and craniotomy on one occasion had been necessary at her labors. She also had hæmatoma of the vulva after one labor. In the pregnancy under consideration a tumor occupied the space behind the uterus, deep in the pelvis. From its consistence and position a diagnosis of dermoid cyst was made, and careful examination showed that the tumor was so firmly adherent that it could not be pushed out of the pelvis.

Accordingly, the operation was undertaken by vaginal incision. Under chloroform narcosis the posterior vault of the vagina was widely opened, when it was found possible to push the tumor down by supra-pubic pressure, puncture it with a trocar, and thus remove the tumor entirely. There was profuse hemorrhage, which necessitated the sewing together of the peritoneum and edges of the vaginal wound. It was found that the sigmoid flexure was so closely adherent to the tumor that in separating it the outer layer of the bowel was torn. This was repaired with fine silk, the vaginal wound closed through the greater part of its extent, and a drain of iodoform gauze placed in the wound. The patient made an uninterrupted recovery and the pregnancy was uninterrupted.

Braun's second case was that of a woman, aged forty-three years, a multipara, whose eighth pregnancy had proceeded to the eighth month. A tumor was found behind the womb, so large that it was impossible to remove it through the vagina. Accordingly, the patient was delivered by Cæsarean section and the uterus closed in the usual manner. It was then possible to turn out the ovarian cyst and to remove it without puncture. Its pedicle was divided into three portions and hemorrhage prevented in this manner. This patient also did well, and her pregnancy was not interrupted.

A Case of Inoperable Dermoid Cyst Complicating Pregnancy.—In the *Annales de Gynécologie*, April, 1899, HERRGOTT reports a case of a patient who had a cystic tumor filling the pelvis and dipping deeply down upon the right side. She was so far advanced in pregnancy that induced labor was not appropriate. The tumor could not be dislodged, and accordingly the patient was delivered by Cæsarean section. The wound in the uterus was closed by catgut. The patient bore the Cæsarean operation fairly well, but lost blood and became weakened. On examining the tumor after the uterus had been emptied it was found so firmly adherent that operation at that time was declined, and the abdomen was closed.

The recovery of the patient was complicated by infection in the uterine wound originating in the catgut employed. Suppuration occurred and a fistula opened into the uterus. Through this several long strands of catgut were removed, and the patient finally recovered from the Cæsarean operation.

Two Unusual Cases of Ectopic Gestation.—In the *Monatschrift für Geburtshülfe und Gynäkologie*, Band ix., Heft 4, THOMSON reports two interesting cases of ectopic gestation from the hospital at Odessa.

The first was that of a multipara, in whom a tubal pregnancy upon the right side could be clearly diagnosticated. The symptoms were typical, and finally rupture occurred, for which abdominal section was performed, and the tube and pregnancy removed. The patient made a good recovery, but shortly after leaving the hospital complained of similar symptoms, referable to the left side of the pelvis. She again entered the hospital, and it was found that tubal pregnancy existed in the remaining left tube. This was removed by vaginal section, some difficulty from bleeding being experienced and controlled by packing with iodoform gauze. The patient ultimately made a good recovery.

Case second was that of a multipara who came to the hospital complaining of abdominal pain following an abortion. On examination there was a tumor in the lower part of the abdomen and bulging in the posterior wall of the vagina. The diagnosis of ruptured ectopic gestation was made, with the formation of hæmatocele, and the tumor was opened without anæsthesia through the posterior wall of the vagina. A profuse discharge of dark blood followed, which yielded to drainage and douching. The patient gradually made a complete recovery.

The Intra-uterine Cry.—Cases in which the child has been heard to cry in the mother's womb have been reported, but many of them rest upon very insufficient observation. GUMMERT (*Monatschrift für Geburtshülfe und Gynäkologie*, 1899, Band ix., Heft 4) was able to find thirty-three reported cases, seven of which seem to have been carefully observed. He adds to this number an interesting case occurring in his experience, as follows:

The patient was a multipara, with a flattened pelvis, a much relaxed and dilated birth-canal, which had been lacerated and not closed, and with partly dilated cervix. The child was in brow presentation and the membranes ruptured. Gummert determined to perform version, and accordingly introduced the right hand into the birth-canal, when air was felt and heard to enter the birth-canal as the operator's arm dilated it. As the hand grasped the foot which lay nearest the child was distinctly heard to cry. There were present a midwife, the family physician, and the husband of the patient, beside the operator, and each of these persons could distinctly recognize the fœtal cry. The patient was immediately anæsthetized, and version proceeded readily until the extraction of the head, when some difficulty was experienced. To the astonishment of all the child was not asphyxiated, but was vigorous and cried immediately after birth. Mother and child made a good recovery.

The circumstances of this case were remarkably favorable for this occurrence. The relaxed and widely open birth-canal, the ruptured membranes, the very relaxed uterus, the brow presentation of the child, and the introduction of the hand for version enabled air to proceed directly to the fœtal mouth. It is somewhat difficult to understand why the child cried, as the placental circulation was not interfered with. The most natural explanation lies in the reflex irritation produced primarily by the hand of the operator, and secondarily, by the air entering the birth-canal.

Radiography of the Pregnant Uterus.—Numerous attempts have been made to secure an outline of the fœtus in utero by the Röntgen rays. Some years ago the reporter succeeded in obtaining a tracing of the cranium and skeleton of a living child in the womb of its mother in the ninth month of pregnancy. A clear outline, however, was difficult at that time to obtain.

In the *Annales de Gynécologie*, April, 1899, VARNIER calls attention to his report, made at the Congress in Moscow, and to further experiments upon the cadaver which he has carried on with the Röntgen rays.

Dim outlines were obtained upon the living pregnant patient, but no clear picture. Recently by lengthening the time of exposure Varnier was able to secure an outline of the contour of the fœtal head, and also to determine whether or not it had entered the pelvis, and to obtain an idea of its volume, of its position, and of the degree of flexion and engagement. When these pictures were made with the mother in the dorsal position no tracing was obtained of the vertebral column of the mother nor of the fœtal limbs. This at present seems to be the extent to which this method of diagnosis is applicable in the study of obstetrics.

Two Successful Cæsarean Sections.—In the *British Medical Journal*, May 6, 1899, MADDEN reports from the hospital at Cairo two successful Cæsarean sections.

The first was an Egyptian woman, a rhachitic dwarf. She was not in labor when admitted, but was kept under observation and operated upon so soon as labor began. The method employed was the usual one, so far as incision of the uterus was concerned. The uterine cavity was irrigated with hot, sterile water, and a large drainage tube passed, extending from the cavity of the uterus to the vaginal orifice. Interrupted silkworm-gut stitches were used to close the uterine wall, and the Fallopian tubes were divided by silk ligatures to prevent further impregnation. The abdominal wound was also closed by interrupted silkworm-gut stitches.

The second case was also a rhachitic dwarf, who was much exhausted in labor, and who was delivered as rapidly as possible after admission. The method of operating was the same as in the first case, except that no drainage tube was employed. After the operation the patient collapsed, but subsequently rallied. Many of the stitches suppurated, and the uterine discharge was offensive. This finally ceased, and the patient was transferred to the medical ward, where she subsequently died from pulmonary complications.

On post-mortem examination the lungs were found extensively diseased. The wound in the uterus had healed. The ligatures on the divided ends still held, and were closed in a mass of connective tissue.

[These cases are interesting because of the employment of buried silkworm-gut in the abdominal wall and the ligation and excision of the Fallopian tubes to prevent conception. This method of operating we believe to be much inferior to hysterectomy with intrapelvic treatment of the stump.—ED.]

Atrophic Marasmus of Nurslings.—In the *British Medical Journal*, May 6, 1899, BAGINSKY contributes a paper upon this subject. From his studies in infants dying with gradual wasting he believes that a chronic catarrhal inflammation of the intestine is the cause of this condition. He found repeatedly on post-mortem examination inflammatory proliferation of the small intestine at its upper part. In the lower portion the changes were of an atrophic nature. Accompanying this there is extensive atrophy of the wall of the intestine, and this extends throughout the entire length of the digestive tract. All the layers of the bowel are affected, the result being that the child cannot digest food, and hence perishes of starvation.

Cases are occasionally found in which anatomical changes cannot be demonstrated, but such are the exception and not the rule.

The Iodine Reaction in Leucocytes in Puerperal Septic Infection.—In the *Berliner klinische Wochenschrift*, 1899, No. 6, KAMINER reports the results of his investigations upon eighteen cases of puerperal septic infection. He was able in these cases to demonstrate distinct reaction with iodine, caused by an unknown substance in the leucocytes of the patient's blood.

Wounds of the Nipple in Lying-in Patients.—In the *Archiv für Gynäkologie*, 1899, Band lviii., Heft 2, PLATZER contributes a paper with the foregoing title. His studies were made in the clinic at Budapest, and his material comprised one thousand patients. He found that the only cause for lesions of the nipple in these patients was nursing. Three factors tend to bring this about: First, the bite which the child gives with its gums; second, the traction which it makes upon the nipple, and, third, the maceration of the epithelum of the nipple caused by the mother's milk and the secretions from the child's mouth. The stronger the child seizes the nipple and the longer and more vigorously it pulls, the greater is the danger of wounding. Badly formed nipples are more apt to be injured than those well developed. Over one-half of the patients had lesions of the nipple, and these were more frequent in primiparæ than in multiparæ. Of the former 60 per cent. had well-developed nipples, while of the latter 90 per cent. It is found that the tendency to wounding grows less after each confinement.

These injuries may be divided into two general classes—in one, in which a portion of the nipple is actually removed, while in the other a superficial part of the nipple is wounded without a deep lesion. The first class are called excoriations and the second fissures. Excoriations arise from bruising the nipple by the jaws of the child. An extravasation of the blood occurs between the epidermis and the true skin. As nursing proceeds the cover of this tumor gradually disappears, and there is formed a moist wound. This heals slowly under the constant irritation of repeated nursing.

The second class of lesions occurs where the fissure forms between the epidermis and the true skin. This fills with clear fluid, forming one or more vesicles. These disappear after several hours, a crust taking the place, which is soon torn off. This makes a wound, which heals slowly under the influence of nursing. Maceration itself rarely causes a wound, but it is an important factor in preventing the healing of injury and in increasing the lesions. Fissures of the nipple are caused by a congenital condition of the skin covering the nipple. The epidermis is much thinner than any other portion, and hence a wound easily occurs. This begins as a very small wound, but extends deeply into the connective tissue of the nipple. They heal very slowly because the margins of the wound are separated at each nursing. Ulcers upon the nipple may follow after any wound. They are caused by infection, usually of a mixed nature, and resemble ulcers on other portions of the body.

Wounds of the nipple usually occur on both sides, and are very apt to happen repeatedly in the same patient. They generally occur during the first week after the birth of the child, and none were found later than the seventh day of the lying-in period. Most of them heal within ten days, while some persist several weeks. During the usual period of hospital treatment 30 per cent. of fissures failed to heal, and but 15 per cent. of excoriations; 2 per cent. of cases having fissures developed mastitis, and but five-tenths of 1 per cent. of those having excoriation only.

Wounds of the nipple are diagnosticated by pain which the patient has upon nursing. In four of these cases this pain was so great that nursing was abandoned. Fever is not caused by clean wounds of the nipple. In each case where fever was present mastitis existed as a complication. Slight fever occurred where ulcers formed. The onset of mastitis was indicated by a marked rise of temperature. So far as treatment was concerned, massage and washing was sufficient in most cases during pregnancy. Compresses of 2 per cent. carbolic acid solution were especially valuable when a wound had occurred. Dry dressings were tried, but were not found available. The mouth of the child was not washed out in these cases. Of the two treatments, the dry sterile dressing was found the better in simple cases of excoriation. Where fissures existed, carbolic compresses were found better.

When wounds of the nipple occurred it was found very advantageous to stop nursing for one or two days. In cases of mastitis nursing must be suspended. The secretion of milk did not cease in these cases unless nursing was omitted for as many as five days.

The use of the nipple shield was especially advantageous and undoubtedly prevented many wounds of the nipple. Ulcers upon the nipple were washed twice daily with 1 : 1000 bichloride soluton, and then powdered with dermatol. They rapidly cleaned in one or two days. Where mastitis was threatened nursing was at once stopped, and the breast bandage and an ice-bag applied. These measures usually sufficed to prevent the formation of pus.

The reviewer desires to call attention to the excellent result obtained by treating all puerperal women with sterile breast dressings. These are kept in place by a breast binder, with shoulder pieces which enable the nurse to compress each breast as its condition indicates. This simple device, with the use of the nipple shields, has in our experience rendered wounds of the nipple and severe lesions exceedingly rare.

OPHTHALMOLOGY.

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Mobility of the Artificial Eye after Enucleation.—PRIESTLEY SMITH, referring to the imperfect mobility of the artificial eye worn after enucleation, and its sunken position, points out the importance of any measures that will do away with these drawbacks without impairing the advantages which this operation has over the substitutes that have been proposed for it. The mobility of the artificial eye will vary with the way in which the enucleation is performed. If the conjunctival bed on which it will rest is to move in association with the remaining eye its connections with the muscles and the integrity of these latter must be preserved with the utmost care.

Acting on a suggestion of H. Schmidt, to fasten the recti muscles to the conjunctiva by suture, Smith has devised the following procedure, which he practises as the first step in the enucleation of the eye. The globe being rotated strongly outward, a narrow horizontal fold of the conjunctiva over the internal rectus is pinched up, so as to include the subjacent connective tissue and muscle, and a black silk suture is carried through these structures by means of a curved needle. To pinch up the muscle it is necessary to use very fine forceps with sharp teeth, and to press the tips firmly into the tissues. The suture is tied firmly, but not too tightly. A second suture is applied in like manner to the external rectus, and the upper and lower recti may be treated in the same way.

The nearer to the canthus one places the tips of the forceps the easier it is to make sure of picking up the muscle; but if the suture be placed too near the canthus the movement of the conjunctiva may be restricted rather than increased.

The enucleation is carried out with care, to divide the conjunctiva as close to the margin of the cornea as possible, to separate the tendons with the least disturbance of Tenon's capsule, and to avoid cutting the sutures in the process. Patients treated in this way usually left the hospital as after an ordinary enucleation, on the fourth or fifth day, and the sutures were removed a week later.

Smith also points out that the artificial eye should be in every way less conspicuous than the real eye it is supposed to match, however lustreless that may be. The white of the eye should be no whiter, the pupil no blacker, the corneal margin no better defined, and the visible portion a little smaller than that of the real eye. We frequently recognize the artificial eye by its superior size and brilliancy, rather than by its defect of prominence and mobility.—*Ophthalmic Review*, May, 1899.

H. SNELLEN (Utrecht) points out that artificial eyes were used before it became customary to enucleate the eye for serious injury or disease. The shell-shaped prothesis was especially planned to be worn over a retained shrunken eyeball, and does not answer the purpose well after enucleation.

In seeking a form better adapted for use after this operation, he first tried filling the concavity of the usual artificial eye with plaster-of-Paris or with gutta-percha. He found that in spite of its greater weight the patient preferred an eye so filled in to one of the usual form. Subsequently, he had the same forms worked out in glass. He finds there is need for three distinct forms of artificial eye—viz., the shells now generally employed, which are especially suited for use over a shrunken eyeball or after a Mules operation; a form of double-walled shell, concave backward, for use with a smaller stump, as after simple evisceration, and an artificial eye-globe, flattened posteriorly, to use after an ordinary enucleation.—*Klin. Monattsblätter f. Augenheilk.*, March, 1899.

[The plan of making the artificial eye to fit the orbit after enucleation seems more rational than the attempt to make the orbit fit a form of artificial eye not designed for it by inserting "artificial vitreous" bodies of glass, silver, aluminum, or rubber. That the mobility of a well-fitted artificial eye may be greatly increased by some such procedure as that described by Priestley Smith must seem probable to one who has carefully watched the influence of the ocular muscles on the form of the conjunctival sac after removal of the eyeball.—ED.]

Fatal Hemorrhage from the Conjunctiva.—A. J. ABBE (Fall River) reports a case of hemorrhage from the conjunctival surfaces of the lids which proved fatal within fifty-two hours after birth. At birth the left upper lid appeared red and swollen, and twelve hours later a thin straw-colored discharge was noticed, for which a 6 per cent. solution of silver nitrate was instilled, a drop in each eye. In two hours there was a bloody oozing from the left eye, and four hours later a steady trickling of blood. One hour after that the right eye began to bleed. There was no bleeding from any other point. The mother was healthy, and no case of hæmophilia was known in the parents' families. Pressure had but slight effect in controlling the hemorrhage. Abbe collected a number of recorded cases of severe or fatal hemorrhage from the conjunctiva. In the two cases in which it occurred within a few days after birth it followed the instillation of solutions of silver nitrate. —*Annals of Ophthalmol.*, January, 1899.

[Cases of serious hemorrhage following the use of silver nitrate solutions in the eyes of the new-born are so rare that the risk ought not to prevent the use of such an efficient remedy for ophthalmia neonatorum, or even its employment as a preventive measure (the Credé method), when there is a strong probability that the child's eyes have been exposed to infection. But it ought to be considered as having some bearing on the proposition that the eyes of all new-born infants be subjected to such treatment. It may be noted, as long ago pointed out, that applications of this drug to the conjunctiva should not be repeated so long as that membrane shows red or bleeding points due to a former application.—ED.]

Lymphoma of the Lids.—MYLES STANDISH (Boston) reports two cases. One case was that of a man, aged sixty-six years, who came for increasing difficulty of opening his eye, which had been noticed for about a year. He had previously undergone the removal of an enlarged tonsil, said to present a lympho-sarcoma. The growth was removed from the lids, and in two years had not returned. It was found soft, friable, and made up largely of lymphoid-cells having no definite arrangement with regard to the connective tissue stroma of the part.

In the other case, that of a woman aged sixty-three years, the tumors involved the lids of both eyes, and had been slowly increasing for five or six years. There were also small rounded growths in the pharynx. Five operations were done in eight months. The growths recurred and increased, and the pharynx became so obstructed that the patient could not breathe lying down. The administration of potassium arsenite solution was then commenced, the doses being increased to a maximum of ten drops three times a day. At the end of thirty days the tumors were diminishing in size; twenty days later they had decreased one-half, and before the drug was discontinued, at the end of four months, they had entirely disappeared.—*Trans. Amer. Ophthalmol. Society*, 1898.

[There are reported in ophthalmic literature a number of cases in which the diagnosis of sarcoma of the orbit and lids has been based on careful clinical, and sometimes microscopical, study of the case, but the patient refusing to submit to operation, the tumors have disappeared spontaneously. There can be little doubt that these cases are really similar to the above, and probably they would not present very great difficulties of diagnosis, now that it is recognized that such growths may occur in the orbit without marked evidence of lymphoid disease elsewhere.—ED.]

Lachrymal Disease.—H. D. NOYES (New York) strongly recommends the use of the style for many cases of lachrymal stricture. He prefers one made of pure silver, usually not larger than the No. 6 Bowman probe, and having the upper end bent so as to lie on the side of the nose close to the caruncle. It needs to be worn from four to twelve weeks, according to the pathological character of the stricture. After this mild irrigation of the passages with the aid of a dental syringe completes the recovery; but a large probe may be introduced once in two weeks, until it is evident that all tendency to relapse has disappeared. After dispensing with the style the entrance hole into the sac contracts, and for the passage of a probe this may need slitting up, and to sensitive people the use of either cocaine or nitrous oxide is desirable.—*New York Eye and Ear Infirmary Reports*, January, 1899.

Iritis of Nasal Origin.—E. LEFRANCOIS (Cherbourg) reports the case of a woman, aged thirty-two years, who came with iritis of the left eye of about three weeks' standing, corneal deposits, and vision reduced to 1/50. She was free from syphilis, gonorrhœa, rheumatism, or tuberculosis. The iritis was at first ascribed to menstrual irregularities, but menstruation soon became normal, and the iritis continued unimproved by treatment until the patient became discouraged and ceased attendance. After several weeks she returned with more violent inflammation of the eye, and it was then discovered that nasal obstruction had existed for several months. The right side of the nose was found normal, but the left contained a cheesy, fetid mass. The removal of this mass and cleansing of the nose restored it to normal. The inflammatory symptoms quickly subsided. By the end of the month vision had risen to 1/2, and three months later full vision had been regained.—*Recueil d' Ophthalmol.*, March, 1899.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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Acute Diffuse Gonococcus Peritonitis.—CUSHING, in the *Johns Hopkins Hospital Bulletin*, May, 1899, describes two cases of diffuse fibrinous peritonitis secondary to salpingitis. In both cases gonococci were found in smears from the fibrin covering intestines and in the pus from the oviducts. In one case all cultures from the abdomen were sterile; in the other, in cultures from fibrin covering the liver and lining the pouch of Douglas, an abundant growth of the gonococcus was obtained.

In both cases smears from the urethra and vagina were negative, although both patients gave a history of gonorrhœa.

[With the exception of the case of acute pelvic peritonitis reported by Wertheim in 1882, these are the only reported cases of acute gonococcus peritonitis with satisfactory bacteriological examinations.]

On the Hitherto Undescribed Peptonizing Diplococcus Causing Acute Ulcerative Endocarditis.—MACCALLUM and HASTINGS (*Johns Hopkins Hospital Bulletin*, 1899, vol. x. p. 46) describe a micrococcus pathogenic for man which they found in a case of acute ulcerative endocarditis.

The organism was obtained in pure culture twice during life from the blood of the basilic vein, and at autopsy from the heart's blood and the aortic vegetations, as well as from infarcts in the spleen and kidney, and from the lung. Sections of the aortic valve showed the fibrinous vegetations to be loaded with masses of diplococci.

The chief peculiarities which distinguish it from the pyogenic cocci already described are:

1. The mode of growth, which resembles that of the micrococcus lanceolatus, the diplococcus intracellularis meningitidis and the streptococcus rather than that of the pyogenic staphylococci.
2. The action on gelatin, which resembles that of the staphylococci.
3. Its activity in peptonizing milk and coagulated blood-serum, in which it differs from all the above-named pyogenic cocci.

In virtue of this last property they propose the name *micrococcus zymogenes.*

Contributions to the Study of the Bacterium Coli.—Escherich, in his paper read before the German Congress of Internal Medicine at Carlsbad, April, 1899 (*Cent. f. allg. Path. u. Path. Anat.*, 1899, x. 413), stated that in cases of colitis contagiosa of children and allied disorders of adults the stools contain two varieties of colon bacilli. The blood of the patient exerts an agglutinative action upon bouillon cultures of one but not of the other.

As is well known, the term "bacillus coli" embraces a series of closely related bacteria. They have a number of properties in common, chief of which are gas-production and decomposition of proteids. The variations are apparently due to differences in the food-supply or soil upon which the organism develops.

The agglutination reaction shows that the race of colon bacilli normally present in the intestine varies with the individual. But in the same infant the same race is quite constantly found. Every individual has a special race in his intestines—not a confused mixture of bacilli introduced with the food. This "personal race," as Escherich terms it, is non-pathogenic as far as its host is concerned.

Infection with the bacillus coli can occur only when virulent forms gain access to the body.

Primary Melanosarcoma of the Rectum.—Wiener (*Beiträge zur path. Anat. und allgemeinen Path.*, xxv., Band ii., Heft s. 322) compares a primary melanosarcoma of the rectum in man with two similar cases in horses. Sections from similar tumors from various parts of the human body are described for comparison.

Tests for iron, to ascertain the hæmatogenous origin of the pigment, were negative.

The pigment masses are formed by coalescence of minute granules, since he found all gradations, from finely granular spindle-cells to large round-cells, filled with masses of pigment. Free pigment is due to the destruction of these older cells.

In the case he describes the primary focus was probably in the pigment-cells of the anal region, whence it infiltrated the submucosa.

He argues against the origin of these tumors from pigmented epithelial-cells, because the formation is most marked around the bloodvessels.

As an unexplained fact, he mentions the pigmentation of connective tissue in the centre of some skin tumors. This was most like the deposition of pigment in tattoo marks. The epithelium of skin tumors is thinned mechanically by the growth below. Yet an ingrowth of epithelial cells into the underlying tissue does occur beyond doubt.

Wiener agrees with Oppenheimer, that the renal epithelium is colored a diffuse light brown.

Metastases in the liver may present circumscribed nodules or a diffuse infiltration.

As a general rule, in melanosarcomata in man the bloodvessels are involved, either by a perivascular growth or an invasion into the vessel wall, or an actual penetration of the intima and projection into the lumen. This condition has probably caused the statement that melanosarcomata arise from bloodvessels. The demand for abundant nutriment may affect this direction of growth. The dilatation of capillaries may be entirely explained by mechanical pressure. Metastases are primaly affected by the bloodvessels, and are most common in the brain and liver.

The differences in the character of the growth in horses are interesting. The tumors do not penetrate deeply and metastases are much fewer. The growths are harder, firmer, and the nodules are not so liable to softening. There is no perivascular arrangement of the cells, all of which are pigmented. There is much less tendency to malignancy.

Bone Formation in the Brain.—THOMAS (*Medical and Surgical Reports, Boston City Hospital*, 1899) reports a case of the formation of true bone in the brain, resulting from the presence of coccidia oviformia. The patient died of pneumonia, and the tumor had caused no symptoms during life. At the autopsy, aside from the condition found in the lungs, a small, calcareous mass was found in the anterior central convolution, which was atrophied. This mass, on microscopical examination, was found to consist of true bone (with laminations, lacunæ, and canaliculi), containing narrow spaces in which were œdematous connective tissue and occasionally large, granular connective-tissue cells (fat granule cells). Outside of the bone was a layer of osteoid tissue, and the whole was surrounded by a layer of increased neuroglia tissue—a secondary gliosis. Near the nodule were also seen long, spindle-shaped spaces surrounded by connective tissue and giant-cells, the areas resembling the granulation tissue sometimes seen around fat crystals. In the centre of the nodule was a large space filled with granular detritus in which were many small, oval bodies. These bodies, the coccidia, had a distinct capsule, occasionally double, and were either empty or filled with granular matter. The author concludes that the process was one of acute degeneration and softening of the brain from the presence of the coccidium oviforme, followed by encapsulation; the formation of fat crystals came from the breaking up of the myelin and other nerve substances and leucocytes; granulation tissue formed about this area, and was followed by ossification and secondary gliosis in its neighborhood. The author has been unable to find a similar case reported, unless it be that of Bidder, in Virchow's *Archives*, 1882, p. 91, who described rather vaguely a number of rounded bodies, which he took to be degenerated cells, in the centre of a bony tumor of the brain.

Thomas collected twenty-two cases of bony tumor of the brain, sixteen in the cerebrum, including one in the corpus callosum; five in the cerebellum, and one in the infundibulum. He concludes that the formation of bone in the brain is always a secondary process, sometimes occurring in new growths, but more often in connective tissue, such as forms after encephalitis of slight intensity.

Secondary Pneumococcus Infection.—DERFLOCQ and LEJONNE (*Soc. Med. des Hôp.*, Paris, November 25, 1898) report the following interesting secondary infections with the pneumococcus in a case of pneumonia: An arthritis, abscess of tissues around the larynx, hyperplasia of the inguinal and crural lymph-nodes, psoitis, and a terminal meningitis.

Urotropin as a Urinary Disinfectant.—M. W. RICHARDSON (*Journal of Experimental Medicine*, January, 1899) reports the result of the use of urotropin as a disinfectant for the urine in typhoid fever. He reviews his previous work on the bacteriological examination of the urine of thirty-eight cases, in nine of which he found the typhoid bacillus always in large numbers and practically in pure culture. The bacilli were found in the late stages of the disease, often persisting far into convalescence.

In the series which he now reports the typhoid bacillus was found in fourteen out of sixty-six cases examined. Nine of these cases were treated with urotropin, and in every case the bacilli disappeared from the urine. In seven cases, which were followed closely, the bacilli did not return. The urotropin was administered in doses of ten grains three times a day. With the exception of one case, in which two hundred grains were used, sixty grains or less were found sufficient to produce the desired result.

Urotropin, a compound of ammonia and formaldehyde, was first introduced by Nicolaier in 1898 as a disinfectant of the urine.

The writer considers the disinfection of the urine of typhoid fever patients as important a sanitary measure as the disinfection of the stools, and as it is impossible to make a bacteriological examination of the urine in all cases, advises the administration, during convalescence, of thirty grains of urotropin daily for ten days.

A Contribution to the Study of the Bone-marrow.—PIO FOA'S (*Ziegler's Beiträge*, Band xxv., Heft 2) contribution deals chiefly with the so-called giant-cells of the bone-marrow Flemming's and Hermann's solutions were used as hardening agents. For the reticulum of the bone-marrow and for differentiating the protoplasm of the giant-cells Mallory's stain gave the best results. Other stains used were those recommended by Ramòn Y. Cajal and by Van Gieson.

In man the protoplasm of the giant-cell is described as having three layers—an inner finely granular protoplasm which immediately surrounds the parts of the compound nucleus, an intermediate layer of thick fibrillar compact protoplasm which surrounds more or less completely the inner layer, and an outer layer made up of a reticulum of thread or cilia-like processes which are generally on the broader side of the cell-body.

These layers vary in different animals and in different stages of development and functional activity.

Multiplication of the nuclei of the giant-cells he believes to take place without division of the protoplasm There is no evidence of karyokinesis. It is a simple direct nuclear division which must be considered as a retrograde process leading to destruction of the cell.

He does not think that giant-cells form any of the blood-cells, or are formed by them. That the giant-cells contain, occasionally, a polymorphonuclear leucocyte indicates a phagocytic action rather than the formation of new cells. The theory of Heidenhain, that the presence of leucocytes in giant-cells indicates that the giant-cell is dead is not borne out by careful examination, for in all the cases the staining reaction gives no evidence of degenerative changes in the giant-cell, but does give evidence of changes in the included leucocytes.

By animal experimentation it was found that this phagocytic property of the giant-cells was increased by inanition, suppuration, exhausting hemorrhages, and by intravenous injections of lecithin, milk, and filtered cultures of the pneumococcus and the staphylococcus pyogenes aureus.

In all these cases emboli of giant-cells were found in the capillaries of the lungs, where they were destroyed, and never caused thrombosis. These cells reach the general circulation by being forced through the light walls of the marrow capillaries.

Foà believes the giant-cells to be formed from the true marrow-cells, which have much protoplasm and a single large vesicular nucleus with deeply stained border which contains a prominent nucleolus. These cells he has often observed showing different grades of nuclear division.

The article is illustrated by two colored plates showing thirteen figures.

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PARALYSIS AGITANS AND SARCOMA.

REPORT OF A CASE, WITH AUTOPSY.

BY CHARLES L. DANA, M.D.,
OF NEW YORK.

MY interest in the pathology and pathological anatomy of paralysis agitans began some six years ago, when I read a paper before the Philadelphia Neurological Society upon this subject, and reported the results of an examination of two cases, with autopsies.[1]

A third case was reported by me in the *Post-Graduate* for July, 1896, special neurological number, page 332.

I recently, with the assistance of Dr. Fraenkel and Dr. Muskins, have been able to make a study of the pathological findings in a fourth case, and it is the result of this which I wish to submit. The patient was an inmate of the Montefiore Home, and most of the clinical study was made by Dr. Fraenkel, to whose notes I am indebted. The pathological examination was made by myself and by Dr. L. J. J. Muskins, who contributes some specially careful and laborious studies as to the degree of degenerative change in the cells.

The history of the case is as follows:

J. B., aged sixty-one years, occupation peddler, nativity Hungary, resident of the United States seventeen years. The family history shows us nothing of importance; father dying at sixty-seven, neither parent having any nervous or mental disease. The patient married at twenty-one, and had nine living and several still-born children; had malaria, but denied syphilis, and had been moderate in the use of alcohol and tobacco. Present disease began in 1891, seven years before his death. The cause is unknown, but the patient ascribed it to a fright and fall on the street. The first symptoms were tremor in the left hand, followed by some weakness in that arm. The tremor progressed its usual way, from arm to leg, and from the left side to the right. It involved also, rather early, his speech. He was admitted to the Montefiore Home in 1897. At that time the examination by Dr. Fraenkel showed the following condition: His mental condition is fairly good, though he is slow in thought and not always correct in his calculations. His memory is good. Emotional condition is rather active, as is usually the case in this disease. The speech is monotonous, slow, and at times unintelligible. His physiognomy presents the flushed face and mask-like appearance characteristic of Parkinson's disease. He has the tremor in the arms and head, also in the legs to a less extent. This tremor, while in general slight and stable, increases at times on intentional movements. There is a very considerable rigidity of the limbs, as well as weakness, so that the patient walks with difficulty. He has also the usual trouble in initiating movement; thus when he first begins to rise from a chair he fails, and has to make several consecutive efforts before he finally succeeds. After about twelve or fifteen attempts he gets up quickly, uttering a sigh of relief; all the time his lips, hands, feet, and legs are trembling with more or less intensity. His station is that of the pronounced paralysis agitans type, and the gait is equally characteristic, the steps being quick and short, with a tendency to retropulsion when the patient stops.

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[1] Philadelphia Neurological Society, February 27, 1893; New York Medical Journal, June 10, 1893.

The tremor affects the lips, the neck muscles, the arms and hands, and the legs equally. The head is flexed, trunk flexed, upper extremities adducted at the shoulder-joint, flexed at elbow-joint and the metacarpo-phalangeal joints, and extended in all the phalangeal joints. There is flexion at the knees and hips. The patient looks emaciated and very senile. The skin is dry and scabby, and in parts dotted with small hyperæmic-looking spots all over the body, showing the most of these disturbances in small or large areas, and localized, warty-like growths in the lower extremities, especially on the left. Some of these warts are ulcerating and discharging a bad-smelling hemorrhagic fluid.

The tongue is coated thickly, and when protruded trembles very perceptibly. Pharyngeal reflex is present and motility of soft palate undisturbed. There is inability to wrinkle the forehead, but the motility of the lower facial branches is normal. Pupils small, reaction good. Ocular movements very slow, and the patient cannot reach the extreme lateral positions. Vision and hearing seem normal, as do also smell and taste. There is some stiffness of the jaw and difficulty in swallowing. There is no disturbance of the sensibility of the skin. There is no ataxia or inco-ordination. Superficial reflexes are present and moderately lively; knee-jerks are present.

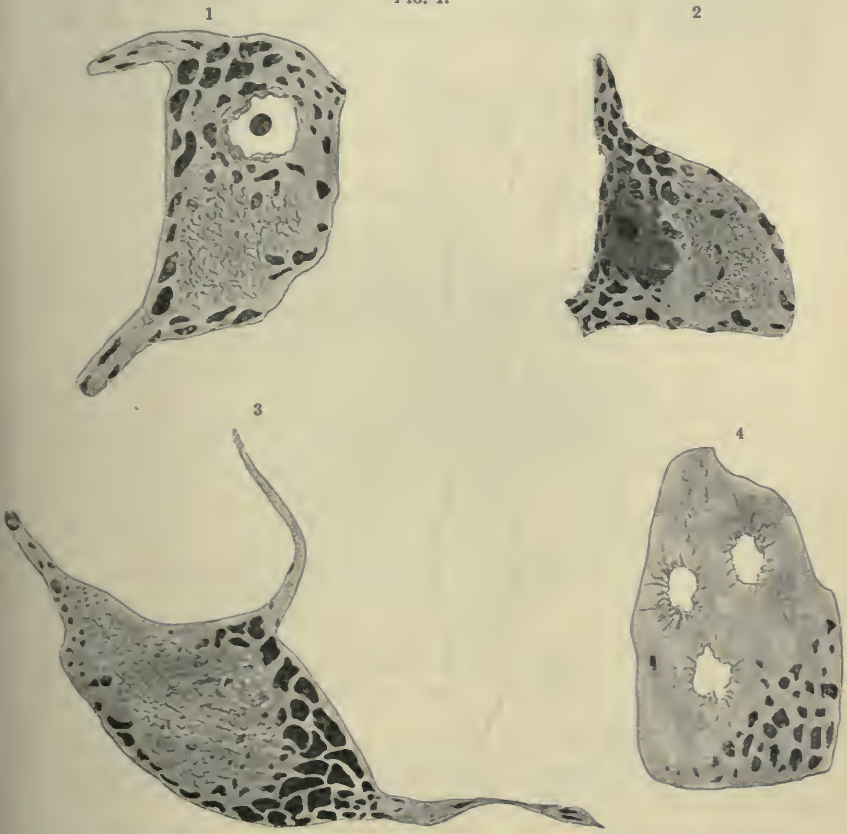
On electrical examination and stimulation there is a decided quantitative diminution of the direct reaction, and contraction is vermiform.

The condition outside of the nervous and muscular field is as follows: The pulse is 72, somewhat hard; temperature, 97.5°; respiration normal; heart and lungs are normal. Manner normal, and there are no anatomical stigmata of degeneration. The mouth is without teeth.

The patient's condition did not markedly change during the rest of his life, except that there was a steady increase in weakness, rigidity, and emaciation. The warty and ulcerating nodules of the skin, which were diagnosed as sarcoma, increased and added to the exhaustion of the patient, who died finally of exhaustion after his illness had lasted *eight years*.

Post-mortem examination was made by Dr. Onuf, who carefully preserved the cord, brain, and parts of the sympathetic in formalin, alcohol, and in Mueller's fluid. The post-mortem, outside of the nervous centres, showed no lesion of importance except the cutaneous sarcoma.

FIG. 1.



1. Anterior horn cell, second lumbar, showing central pigmentation. 2. Second lumbar, lateral displacement of nucleus. 3. Anterior horn cell, upper dorsal, central pigmentation. 4. First dorsal, vacuolation loss of nucleus. (Nissl stain. 1/12 objective.) (MUSKINS.)

Examination of the Spinal Cord. Nissl stains were made by Dr. Muskins of the sections taken from the mid-cervical, upper dorsal, third and fourth dorsal, seventh dorsal, middle lumbar, and upper sacral regions. These showed very striking degenerative changes in the cells of the anterior horns. The changes consisted in marked pigmentation of the cell-body, chromatolyses, loss and displacement of the nucleus, atrophy, and loss of some of the dendrites. The absence of or defect in dendrites is common (Fig. 1). The pigmentation occupied, in some cases, the periphery, involving nearly half the body of the cell, in other cases attacking the centre of the cell-body and following it out, leaving a peripheral portion of fairly healthy substance. In many cases the pigmented part had apparently dropped out, leaving vacuoles, and vacuolization of the cells is a more striking phenomenon than is often seen. This, I think, however, may be largely due to the bad preservation of the specimen, or, at least, due to a post-mortem chemical and mechanical change, caused by putting the tissue through various hardening processes.

An attempt was made, at my suggestion, by Dr. Muskins to estimate the percentage of degenerative cells at different levels. The cells were

FIG. 2.

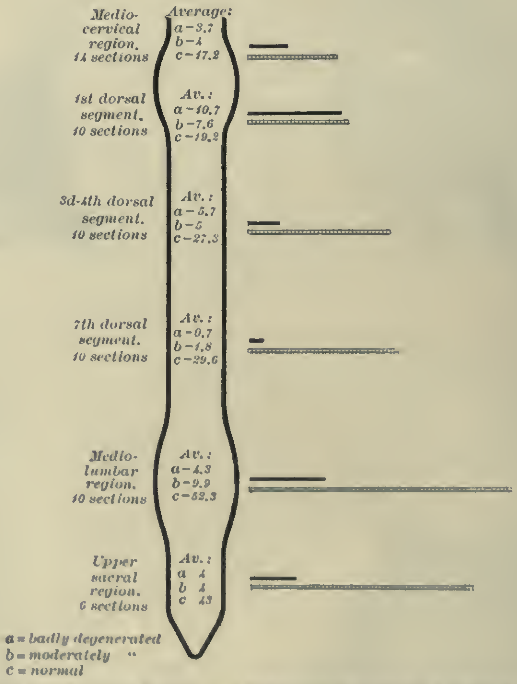


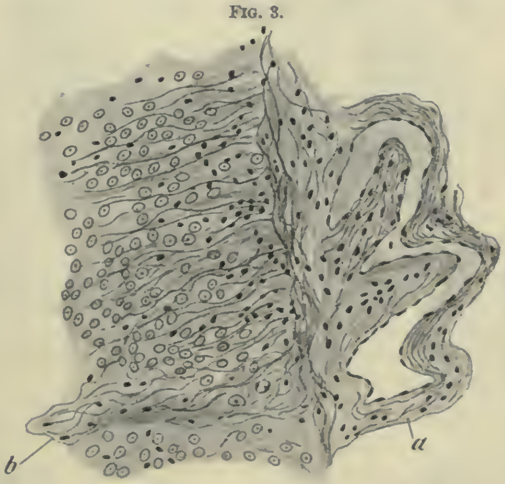
Diagram showing the relative percentage of degenerated nerve-cells in the anterior horn. Dark lines represent cells *a* and *b*.

divided into three categories: (*a*) Those that were extensively pigmented and degenerated, (*b*) those moderately so, and (*c*) those that were nearly normal. Cells of these three categories were counted in the different levels and percentages made out. In all the cells in sixty sections at different levels were counted. The percentages of cells indicated in group *c*, and degenerated cells, indicated by groups *a* and *b*, are shown diagrammatically in light and dark lines, respectively, upon the accompanying diagram (Fig. 2). It will be seen that the greatest proportion of degenerated cells was in the lower cervical and first dorsal sections—the area where the tremor first starts; next to that in the mid-cervical region, then in the mid-lumbar and upper sacral regions. The least affected portion seemed to be the middle dorsal and upper dorsal.

Examination of the columns of Clarke showed some degenerative changes, but, on the whole, their condition was fairly good, certainly much better proportionately than that of the cells of the anterior horns. It is impossible to place any very great weight upon the changes in this area.

The study of sections stained by carmine and Delafield stains, for purposes of determining the condition of connective tissue, showed slight increase in the interstitial connective tissue of the white matter. This is more marked in the marginal columns than in either the pyramidal tracts or the posterior columns, but it is not a very striking increase in either case. The anterior roots showed a greater amount of connective tissue thickening than the posterior. In neither case were the roots very much affected. Stains by Weigert-Pal method showed no very marked change.

FIG. 3.



Showing tortuous vein in posterior septum and slight connective tissue infiltration in posterior column. *a*, Vessel. *b*, Connective tissue. (Delafield stain.) (MUSKINS.)

Stains by the Marchi method were negative, except to show very strikingly degeneration of the cornual cells. The degree of degeneration was shown to be more extensive than was revealed by the Nissl stain. *There was no reaction in the white matter.*

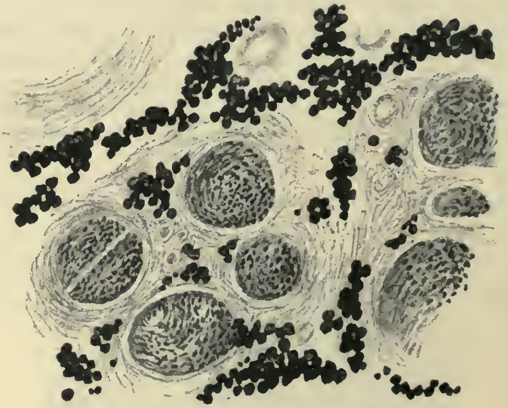
Throughout the whole area of the cord, both in the gray and white matter, there were many large vacuolar areas, such as are often seen in degenerated spinal cords that have been hardened in alcohol. They indicate not only that there has been some general atrophy of the cord and connective tissue proliferation, but probably also some corresponding vascular congestion and dilatation of perivascular areas (Fig. 3).

Occasionally one could see thickened bloodvessels, but on the whole the changes were slight. *There was no general arterial sclerosis.*

The sciatic and ulnar nerves were perfectly normal to Marchi and Weigert stains (Fig. 4).

Brain. The cells of the central convolutions show a considerable degree of degeneration. They are not much pigmented, but the nuclei are often very large, and are surrounded by a bright area, showing that they are splitting away from the body; they are sometimes seen lying at the edge of the cell. There is chromatolysis, making the cell-body look like an open network—a kind of granular degeneration seen also in a previous case described by me. The cells are not much atrophied, and the processes look fairly well. There is not much vascular or neurogliar change. Only the central convolutions were examined.

FIG. 4.

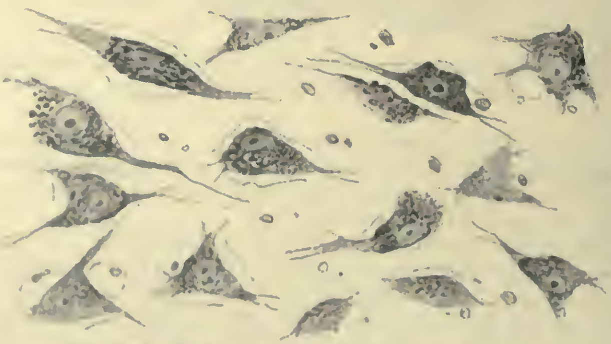


Ulnar nerve.

The *cerebellum* was normal.

The *medulla* showed some degeneration of motor nuclei cells—not as marked as in the cord.

FIG. 5.

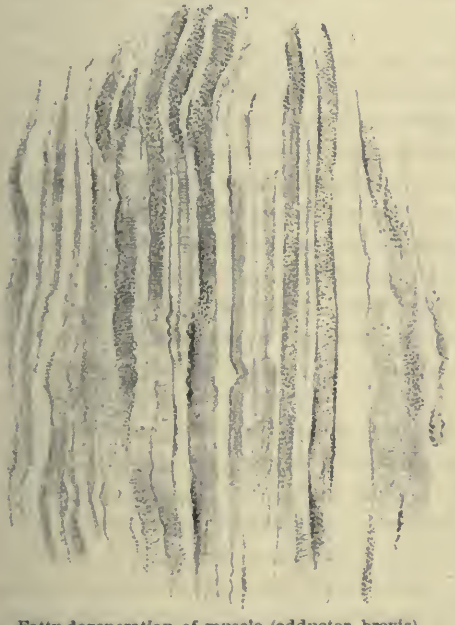


Group of degenerated cells of olivary body. 1/6 objective.

The *inferior olivary body-cells* showed moderate degeneration in nearly all cells, a change that has been noted by others (Fig. 5).

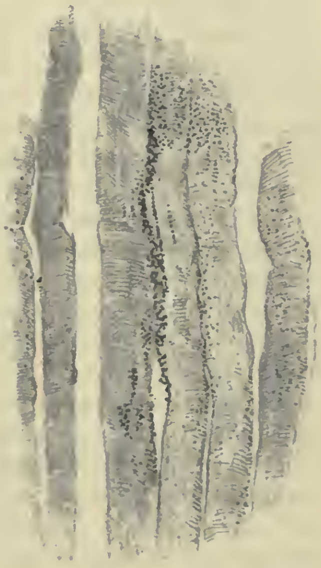
Examination of the Muscles. A piece of muscle from the adductor pollicis and another from the palmaris brevis were removed and stained with picro-carmine, and afterward by the Marchi method. The picric acid stain showed a striking difference between the coloring of different muscle fibres, which was thought to be due, perhaps, to accidental differences in the impregnation with the dye. Examination by the Marchi method, however, showed that a large number of the fibres took on a dark stain, and were full of minute black granules of osmic acid, due to the presence of fat. Upon closer examination it could be seen that there was a slight fatty degeneration of many of the muscular fibres, while the others were apparently perfectly healthy. This staining was usually rather diffuse, but here and there in nearly every field one could see little patches of particularly dark staining, which appeared to be the nerve terminations (end-plates) upon the muscle. Staining by hæmatoxylin showed no increase in the nuclei, no proliferation of connective tissue, and no disease of the bloodvessels. The muscle fibres, apart from the peculiar parenchymatous degeneration shown by the Marchi stain, were healthy in every way, there being no particular swelling nor breaking up of the fibres anywhere, and the striæ were distinct (Figs. 6 and 7). This degeneration of muscle fibre and of end-plates in paralysis agitans is, so far as I am aware, a new observation in the pathological anatomy of the disease, and I must credit my assistant, Dr. Muskins, with preparing the specimen and calling my attention to it.[1]

FIG. 6.



Fatty degeneration of muscle (adductor brevis). ⅔ objective.

FIG. 7.



Fatty degeneration of muscle (adductor brevis). ⅙ objective.

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[1] Under the head of "Intrafibrillary Fatty Degeneration of the Muscle Fibres in a Hemiatrophic Tongue in Tabes," Prof. H. Obersteiner describes (Arbeiten, 1895, iii. p. 183) a somewhat similar condition. In this case there was no nuclear lesion, and the degeneration was ascribed to neuritis. In my case, as the drawing shows, section of the ulnar nerve showed perfectly normal fibres, and my case also the degeneration shows itself more localized, as though end-plates were affected.

The recent observations upon the Marchi stain, particularly by Nonne, seem to show that in its light degrees it indicates *trophic* disturbance of the nerve-tissues, and probably of muscle tissues, and that this degeneration is not incompatible with the *functional integrity* of the organ. It is interesting to find that a muscle which has undergone as many contractions in the last eight years as had this particular one shows this peculiar degeneration alone. The tremor in my patient's case early affected the hand muscles, and, estimating that the tremor was continuous, as in fact it was, from the beginning, during the waking hours, and that the contractions occurred at the rate of about five per second, during sixteen waking hours for eight years, I estimate that this particular bit of muscle had contracted during that time about *eight hundred and forty million times.*

SUMMARY. The anatomical changes may be summed up, then, as follows: Some general atrophy of the cord, moderate increase in connective tissue, and dilatation of perivascular spaces; no special thickening of the bloodvessels, either veins or arteries; no meningeal thickening; pronounced changes in the anterior cornual cells, consisting of atrophy of these cells, pigmentation and vacuolization, loss of dendrites, diminution in the richness of the plexus formed by the dendritic processes; the process most marked in the upper cervical and lower dorsal region; Clarke's column is not markedly affected; the brain cortex shows slight degeneration of cells; the olivary nerve-cells degenerated; the peripheral nerves normal; the muscles and end-plates showing some fatty degeneration.

COMMENTS ON THE PATHOLOGY AND PATHOGENY OF THE DISEASE. There are two views prevailing regarding the pathological anatomy of paralysis agitans. One is that it represents merely a premature condition of senility, and that the changes are the same as those found in extreme old age, the differences being a matter of degree, not of kind.[1] The other view is that the nervous system in cases of paralysis agitans presents changes which differ from those of senility, and although these have not yet been thoroughly studied out, further research will in time discover them. It is this latter view which I most decidedly share. There are, to be sure, many changes in the spinal cord, brain, and even nervous system of paralysis agitans which are more or less identical with those found in the senile nervous system. But to say that paralysis agitans has underlying it nothing but the premature senility is to go utterly against the facts of clinical experience. The symptoms of rigidity and palsy are not those of premature senility. The vasomotor disturbances, the burning and lightning pains, the peculiar rigidity, the hitching of the voice, the sharp interruptions in volitional efforts, are also unlike the phenomena of senility. Even the tremor is essentially different, for the tremor of old age is larger in sweep and involves the head more often, and interferes relatively less with the active movements and comfort of the individual. The tremor of old age is benign as compared with the crippling tremulousness of Parkinson's disease. There is, indeed, little room for argument upon this point. The dissimilarity is so striking, and the symptoms in paralysis agitans are so progressive, severe, and malignant, that it is impossible to believe that there is not a distinctly different anatomical change underlying them. There is, probably, a common condition of increase in interstitial tissue and of proliferative neuroglia natural to advanced years; but I do not find in my cases of paralysis agitans such profound changes in the bloodvessels or such extensive arterial sclerosis as is seen in extreme old age. The pigmentation of the cornual cells exists in both cases, but it may yet be discovered that the neuronic degenerations in paralysis agitans are peculiar in degree and localization, as well as in the way in which they involve the cell-bodies.

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[1] In a recent article by Nonne upon the spinal cord changes in cases of pernicious anæmia (Deutsche Zeitschrift für Nervenheilkunde, vol. xiv, Parts III and IV, p. 192), the author states that he has examined the spinal cords of ten old people, and also the spinal cords in two cases of paralysis agitans, and that he does not find any differences between the conditions in these two cases, nor could he tell the difference in the appearances between the cord of a very old person and that of a person who had had paralysis agitans. To this I can only say that, in the first place, Nonne gives no account of how he has examined the cords of his cases of paralysis agitans, nor whether he has used all possible means of examining them by Marchi's method, the Nissl stain, and so on. In the second place, I can show from my specimens that the cord in the case of paralysis agitans here studied by me does not present the appearance of the senile cord as described by Nonne. There is not the extreme sclerosis of neuroglia increase, and the bloodvessels are positively very little diseased. Third, I must say, again, that paralysis agitans is clinically entirely different from old age, and that if we have not yet discovered the pathological anatomy, it does not follow that we shall not do so, or that the question is fully settled.

The history of the disease shows that it is primarily a parenchymatous nervous disease. The onset of the trouble is sometimes very sudden, and shows the almost apoplectic-like disturbances of certain groups of nerve-cells. Where and what is this disturbance?

The clinical facts and the pathological examinations in cases of paralysis agitans lead one fairly to infer that the incidence of the attack falls (1) upon the dendrites of the cells of the anterior horns of the spinal cord or (2) else upon the end-brushes of the neuraxons that come from the voluntary motor tract and the cortical motor centres of the brain. We might in the latter case establish even a sort of analogy between paralysis agitans and locomotor ataxia. Thus while in locomotor ataxia the effect of the pathogenic poison is to produce a degeneration of the axis-cylinder of the posterior spinal ganglion cells, this degeneration, often apparently beginning in the periphery, and not closely involving the cell-body at first, in paralysis agitans the special poison affects the end-brushes of the axis-cylinders of the cortical cells of the brain, producing a destruction of them, but not involving the main trunk of the axis-cylinder.

This view is somewhat contraindicated by the fact that even in very old cases of paralysis agitans there is no special involvement of the pyramidal tracts.[1] On the other hand, in the very severe cases there is a correspondingly greater destruction of the anterior horn cells, and this destruction especially involves the dendrites and the cell-body, while, even in the bad cases, one sees the axis-cylinder process and the anterior roots still in comparatively normal condition. The most logical conclusion, therefore, that one can reach is that in paralysis agitans there is early a functional disturbance and later a degeneration and destruction of the dendrites of the anterior horn-cells which interfere with the even flow of motor impulses, and, finally, lead to motor weakness and rigidity, owing to the cell being practically cut off from the brain. The fact that in paralysis agitans there is rigidity, but no great increase in the deep or superficial reflexes, is explained also by this interference in the functional activity of the dendrites and the easy flow of impulses from cortical to spinal neuron, and from sensory to motor neuron; for, on account of this, the completeness of the spinal reflex arc is impaired. The difference between this condition and that found in spastic paraplegia, due to a sclerosis of the voluntary motor tracts, is manifest, for there the dendrites of the anterior horns which subserve reflex purposes are normal, while in paralysis agitans all are somewhat affected. The rigidity of this disease is much like that found late after total transverse cord lesions.

PATHOGENY. It will, I think, be found that there is quite a number of degenerative diseases of the nervous system which are due to remote or secondary results of infections and poisons. Syphilis, for example, produces two results: one a direct injury by its exudates and irritating poison, the other a later, slowly degenerative process, due to some paralyzing effect which has been put upon the cell-life. It seems as though the circulation in the body of the luetic poison lessened the longevity of certain groups of nerve-cells, so that after ten or fifteen years the poisoned nerve-cell begins to die. In the same way I have seen persons subjected for years to slight degrees of lead-poisoning suffer at an early stage from a temporary lead paralysis, recover completely, then, twenty or thirty years later, undergo a progressive degenerative disease involving the peripheral nerves and the spinal cord, ending in an extensive sclerosis and terminal softening. The acute infection which causes anterior poliomyelitis is usually cured, and apparently the poison eliminated from the system; but sometimes twenty years after a degenerative process sets up in the anterior cornual cells, which slowly progresses until they all die, one after the other, and the patient himself becomes a paralytic wreck from progressive muscular atrophy.

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[1] Marchi stains do not at all affect the white columns of the cord, but show strongly the cellular degeneration.

I have not space to expand this view of the subject of the secondary results of infection, but I believe it may be developed into the dignity of a broad pathological law, and this, I think, will in time give us some clue to the pathogeny of paralysis agitans. Sometime in the career of these cases the patients have been subjected to an infection or poison from which they have recovered. It has, however, left the imprint upon certain groups of cells and neuronic mechanisms, and when the degenerative period of life comes these less viable structures begin to go to pieces. What the primary infection in paralysis agitans is I do not know, but perhaps some autochthonous poison allied to that of rheumatism. At any rate, there is no other preceding history that is so often obtainable as one of rheumatism, and there are many facts in the clinical history of the disease which suggest a relationship between paralysis agitans and that form of rheumatic manifestation which is known as rheumatoid arthritis.[1]

A STUDY OF A CASE OF FAMILY PERIODIC PARALYSIS.[2]

By John K. Mitchell, M.D.,
of Philadelphia.

The curious condition of periodic paralysis is one of the utmost rarity, and in this country but three cases have been seen, with a doubtful fourth, previous to the ones herein reported. I should omit from the consideration the cases of Rich, where the paralysis was directly due to a hereditary susceptibility to cold, and was distinctly spasmodic in character. Gibney's cases, supposed by him malarial in origin, certainly do not belong to this group either.

I do not propose to enter into the history of the previous study of this disorder except incidentally. An admirable paper by Dr. E. W. Taylor, in the *Journal of Nervous and Mental Disease* for September and October, 1898, contains a very complete bibliography of the previous work, with analyses of all the cases hitherto reported, and to this I am not able to add anything except my own cases.

All the cases observed have presented, with small variations, the same type—a paralysis of the voluntary muscles, usually total except for the head and face muscles, with loss of reflexes, with absence of electrical reaction, with no mental or sensory disturbance, and occurring periodically at somewhat regular intervals. Nearly all of the cases have instances in the parents or ancestors of the patient. In the family of my patient the first one known to have suffered from it was the maternal grandfather of the present victim, a Pennsylvanian by birth, a tinsmith by trade, who had in early life seizures like those from which my patient has suffered, but much less severe. A first cousin of this same grandfather had periodic attacks of paralysis quite as bad as any which have been described. His business kept him travelling much through the rough mountain districts of central Pennsylvania, and he used to say that he was often obliged to get off his horse and " have a paralysis." Both these persons, so far as known to their descendants, ceased to have the attacks in middle life.

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[1] It has long since occurred to me that possibly the disease might be the result of some defect in glandular secretion. In order to test this as far as was possible, I have treated patients with all the known original substances of the body—namely, thyroid gland, thymus, pituitary body, cerebrin, testin, adrenal, etc. These substances have been given in doses running up as high as 60 grains a day, with the exception of the thyroid extract. The results were essentially negative so far as throwing any light upon this mode of pathogenesis of the disease was concerned. The use of thyroid gland makes the patient decidedly worse. The use of the pituitary gland in large doses quieted the patient for a time, but this is only temporary, and the quieting effect I have seen produced in other cases. The other substances had no effect whatever.

[2] Read before the Association of American Physicians, May, 1899.

The mother of the patient is one of six children. Of three elder sisters none have ever had any spells of the palsy. An older brother had one attack, brought on by overexertion, but has never had another. A younger brother has suffered in the same way, but the attacks did not begin with him until he was a grown man, and have since occurred only at long intervals. A daughter of this brother, now between twelve and thirteen years of age, has periodic palsies of the same sort, and full details of these two cases follow my patient's history. None of the other cousins except this one has ever had the family affliction. The mother of the patient began to have periodic paralyses when fourteen years of age, probably at about the time when her menstruation appeared. Their approach was sometimes announced by a slight sense of helplessness, which would last for a whole day. Going to bed with this, she would wake in the morning with total muscular paralysis, usually lasting thirty-six hours, seldom longer, and never more than forty-eight. The paroxysms recurred at long and rather irregular intervals, often months apart, and after she reached adult life decreased in frequency with the advance of years, and ceased altogether at about the thirty-eighth year. She is now forty-four years of age, and presents some interesting symptoms.

Mrs. E. J. is a well-looking woman, scarcely appearing as old as she is, calls herself perfectly well, menstruates regularly, and is active mentally and physically. She has a little difficulty in walking unless the ground is perfectly smooth; a very slight inequality makes her stumble, and if she stumbles she is very apt to fall. This is especially marked at night, when she cannot see where she is going, and has been noticed for some years. When sitting she gets up with some difficulty, rising as if her legs were weak, with a sort of wiggle, and aiding herself with the nearest object upon which she can lean. She thinks this is rather worse of late years, but she had not thought it bad enough to mention until her attention was called to it by questions. Her station is perfectly good, her pupillary reactions normal; the knee-jerk decidedly slow and small, a little better on the left than on the right; on the right there is no ankle-jerk, on the left the ankle-jerk is present. There is muscle-jerk in both arms and in the left leg, but none in the right leg. Galvanic and faradic reactions are normal, and there is no alteration in sensibility. The state of things presents a somewhat mixed character, which were it not for its very long duration, the absence of eye-symptoms and of pains one might incline to think preataxic; but if it were of tabetic nature it would be symmetrical and would not present entirely different qualities of knee-jerk upon the two sides, as it does, in these respects resembling rather the ataxic paraplegia of Gowers than true tabes. Her gait shows no abnormality whatever, but I incline to the belief that the repeated attacks of her earlier life have in some way definitely altered the lower segments of the spinal cord and impaired the control of the legs. There is no trouble with the functions of the bladder, rectum, or uterus.

The present patient, C. H. J., nineteen years of age, is a mechanic in a bicycle factory. But for the neurosis under consideration no hereditary disease is known on either side of his family. His mother's history has been given; his father is living and in excellent health; his younger brothers and sisters are well, although it may be said they have not yet reached the age at which the palsies usually appear. With the exception of the ordinary diseases of childhood his own health has been perfect, his habits good, and his life an active and wholesome one until his present trouble began, in his thirteenth year.

The onset was sudden, without known cause. He awoke one morning and found that he could not move hand or foot; he was able to turn his head from side to side, but could not raise it from the pillow. There was no pain, no loss of sensation, no impairment of function of any kind. About two months after the first attack another occurred, and for three or four years they returned at intervals of about two months, with a duration generally of forty-eight hours, nearly always coming on during the night, so that the patient went to bed feeling no more than a trifling degree of enfeeblement in the legs, and awoke in the morning quite helpless. No possible cause can be assigned in his habits or mode of life. He cannot trace any single attack to excessive exercise, emotion, or indulgence of any description, and except that when they pass he finds himself a little sore and stiff for a few hours; he cannot see that he is otherwise than perfectly well in the intervals.

The intensity of the attack has remained about the same up to the present, but for nearly a year past the frequency of occurrence has become rather greater, and for six months before he was first seen, in

October, 1898, the paralyses had recurred with remarkable regularity upon Wednesday of every week.

It is well to say at once that nothing about the patient between or during the attacks suggests the slightest possibility of a hysterical element. He is a normal, healthy boy, well developed, in admirable physicial condition, and much disgusted with the enforced idleness of this disablement. Many attacks have been seen in the hospital, and the various seizures differ only in the degree of immobility produced. One may be described in detail and stand for a type. Sometimes for a few hours in the afternoon or evening the patient notices slight weakness in the lower limbs, and if examined at this time at least one decided symptom is present—a lessening of the knee-jerk. This happened to be the case when I showed him one evening at the Philadelphia Neurological Society, when he said, after coming into the room: "I am just beginning to feel an attack coming on," and upon examination the knee-jerks were found to be capricious, diminished, and easily exhausted. This prodromal period is not always present. He may go to bed perfectly well and awake in the morning wholly paralyzed from the neck down. I say "from the neck down," but the neck to a certain extent shares in the difficulty. He can, when lying still, turn the head from side to side, but he cannot raise it from the pillow, and if placed in an erect position the head falls forward on the chest, or backward almost between the shoulders, without the possibility of any control on the patient's part.

Breathing in the attacks is somewhat shallow, and appears almost altogether diaphragmatic in character. If he is requested to cough he is unable to, or even to take a normally full inspiration. If the nares are irritated he cannot sneeze, though he feels the annoyance and has a desire to do so.

He does not have much appetite, and says he perceives slight difficulty in swallowing, but this is not evident to the observer. While the paralysis lasts he usually passes water only once or twice in the twenty-four hours and has no fecal movement. There is no disturbance of the mind; speech is not affected, and he has no pain except the discomfort of lying absolutely in one position, which somewhat annoys him. So far for his own statement of his feelings and symptoms.

PHYSICAL EXAMINATION DURING AN ATTACK. The patient is notably paler in the attack than during healthy intervals. His lips are less well colored; his tongue is somewhat coated and his breath has a heavy smell, but there is no change of expression and certainly no mental impairment. He answers readily to all questions and takes an interest in the examination of his symptoms.

Upon study of the chest the breath-sounds are found to show slight general lessening, due, probably, to imperfect dilatation of the chest. On being asked to take a long breath he makes an effort to do it, but has little control of the accessory muscles, and moves the cage of the ribs but slightly. The heart's action and pulse are decidedly changed from normal. The apex-beat is below the fifth rib, rather indistinct, two and a quarter inches from the mid-sternal line. The heart's action varies much in different attacks; it is sometimes a little irregular in time, though no distinct intermittency has been observed at any time. The heart conditions, however, were not always the same during the attacks. Examined several times during October and November in attacks, the heart presented usually a split second sound, very distinct in the pulmonary area, a systolic murmur well heard upon full expiration and limited to the same area, transmitted somewhat up and down the left side of the sternum, strong and decided, but not loud or harsh.

In the latter part of November, examining him one day with Dr. Morris J. Lewis, we both agreed that there was a soft, low, systolic murmur, best heard at full expiration at the second right interspace and very faintly upon the left side. This was a condition which was never found again. Three days later, during an interval, the split second sound was heard at the second interspace, diminishing toward the apex, with a murmur much harsher than before and of greater intensity. The most careful examination with stethoscope and phonendoscope fails to reveal any increase in the area covered by the heart dulness. The pulse is somewhat weak and small, from 80 to 90 during an attack; sometimes, with about the same speed, its tension is increased and its character distinctly dicrotic, as shown in sphygmographic tracings made repeatedly during the attacks.

The heart examinations were made over and over again. I made not less than a hundred careful examinations of the heart in the attacks, and as he was an object of interest to the other members of the hospital staff, the examinations were made many times over by them, and the general opinion confirmed the above statements, which indicate rather a relaxed condition of the heart muscle, as well as of the whole arterial system, than an acute cardiac dilatation. In this belief I am supported by the high authority of Professor J. M. Da Costa, who studied the heart during an attack.

The reflexes in the more severe paroxysms are totally lost except the reaction of the pupil. No contraction can be observed in the pectoral muscles on striking them; the abdominal recti do not contract to ordinary stimuli, the cremasteric reflex is abolished, there are no knee-jerks, and although the patient resents the attempt to secure the plantar reflex by irritation of the sole of the foot, no muscular contraction takes place. Sensation is perfect. The electrical examinaton was many times repeated during the attacks and in the intervals. In the typical attack there was practically total abolition of reaction to any form of electrical stimulation.

In milder attacks some variations upon these general symptoms were noted. Muscle-jerks were sometimes present, the knee-jerks were occasionally found present by reinforcement, the cremasteric reflex was at times not altogether absent, though usually weakened. In the same way the degree of muscular enfeeblement varied a little. In the early part of even severe attacks, during the morning hours, the patient would be able to move his hands, perhaps his forearms, or even his toes. As the day went on the paralysis would become deeper and all movement would be abolished. Return of normal conditions followed much the same order that characterzied the onset. The knee-jerks improved a little, other reflexes reappeared, slight contractility in the muscles was discoverable, and in the course of an hour or so from the beginning of betterment the patient was almost perfectly well. Several times periods of apparent partial recovery were followed by relapses into total paralysis. Usually progress was steady and rapid, and several times we have seen a man who at six o'clock was, so far as power to move or to respond to electrical stimulation could tell, as dead as a twelve-hours' corpse, able to walk about the ward at seven o'clock with all his muscular power, his reactions and reflexes, in normal condition.

Once at least in the course of the several months the patient was under observation he seemed to have a kind of abortive attack, in which during some days he felt dull and had the same sense of lack of complete muscular power which usually precedes a paroxysm. At the same time his color was poor and his appetite not so good as usual. Knee-jerks during the whole of this period were found to be occasionally absent, though reinforcible, and at other times capriciously present, but always diminished. It should be added that this was during a time when he was taking bromide in moderate doses. One important fact developed somewhat late in the case, or at least had not been previously observed. Upon my remarking that I should give him injections of Brown-Séquard's elixir, and that it might have an effect in stimulating the sexual functions, he laughed and begged not to have it, because he said there was sufficient stimulation in the attacks already, and that very often he suffered with partial or complete erection during the period of paralysis.

[Copy of letter from the patient's maternal uncle, Mr. C. H. W., dated January 29, 1899.]

DEAR SIR: I am perfectly willing to give you all the information in my power, but hardly know where to begin. I have been subject to the attacks you refer to from the time I was twelve years old, but have never been completely prostrated since my marriage, sixteen years ago.

The disease (or spells, as we call them) would sometimes come on me during the night, and, while feeling all right at bedtime, would be perfectly helpless on waking in the morning. At other times they would come on me gradually, and I could feel myself slowly losing control of my limbs, and finally became helpless; sometimes I could, by keeping in motion, keep from total collapse. I suffered no pain of any description unless my limbs were cramped, but was perfectly helpless, could move neither hand nor foot, but seemed to have complete control of my talking apparatus, and, with the exception of being helpless, I usually felt exceptionally well. My sense of feeling was normal, but the sense of motion completely gone. I noticed that the attacks were more frequent in damp weather; also, that they were sometimes brought on by unusual exertion.

My daughter has suffered from the same disease, but has been completely prostrated only a few times, and as it happened at a time when I was away from home, I will hand your letter to our family physician, Dr. H. L. McIlhenny.

[Copy of letter received from Dr. H. L. McIlhenny, Norwich, Kansas, March 10, 1899.]

MY DEAR DOCTOR: In reply to your letter of February 2d, will say that I am personally acquainted with Mr. W. and family, to whom you refer in your letter.

Referring to the peculiar family affliction, I have to say that I have seen Mr. W. a number of times suffering with these mysterious attacks, though he has suffered but few in the last few years. The condition is surely a most singular one, never having seen any cases like his or his daughter's, and have never seen any authority covering these cases.

Mr. W., I understand, has given you the details of his case, which are evidently very similar to the attacks with which J. suffers. As to Mr. W.'s daughter, who is now about fifteen years of age, I have seen her in this peculiar condition but once, about one year ago, although she has had two or three attacks since, but they were rather light.

At the time I saw her she had gone to bed in the evening as well as usual, and on waking in the morning she found herself completely helpless—paralyzed. I was called and found her in this paralyzed condition—could not move hand or foot. In all respects the attack was similar to those from which her father suffers, except that she suffered quite severe pains in back and head. All reflexes seemed weakened or absent. She remained in this condition ten or twelve hours, when she began to get better, and by the next day she could help herself and began to sit up. In three or four days she was as well as usual. There does not seem to be any regularity in her attacks, nor do I think that menstruation has any relation to the attacks. I hardly think mental emotion or physical exertion are exciting causes. This young lady has been away from home several months attending school, and I have not heard of her having an attack recently. I forgot to say that in this case (Mr. W.'s daughter) I did not make a *careful* examination of the heart, only to note that the heart seemed all right.

The electrical examinations are of great interest and have been often and carefully made by Dr. J. H. W. Rhein, electrician to the Infirmary for Nervous Diseases.

In the first examination during an attack it was impossible to get any reaction either with faradic or galvanic currents in most of the muscles with the largest amount of currents bearable. With from 30 to 40 milliampères slight response could be obtained in the anterior thigh muscles. It was impossible to complete the examination, on account of the pain caused. In examining a large pad was always placed over the sacral region and a small, interrupting electrode over the motor points of the muscle tested. The K. CL. C. contracture was always greater than the AN. CL. C. contracture.

On the second day of the same attack it was possible to get contracture here and there; for instance, the anterior tibial responded with 20 milliampères, the posterior with 18 milliampères, the sciatic nerves with 20 milliampères, and the biceps of the leg with 30 milliampères. No contraction of the rectus femoris could be obtained with less than 30 milliampères. It was necessary to discontinue the examination, as the strong currents made the boy feel faint and decidedly affected his heart.

In a second attack there was no faradic reaction whatever in most of the muscles. In the erector spinæ muscles there was fair contraction with the greatest amount of current that could be applied. The sternocleidomastoid responded slightly with largest amount of faradic current. This was true also of the other cervical muscles. With the galvanic current no response could be elicited in the cervical muscles with 20 milliampères. It was thought unwise to use larger quantities of this current in the neck region,

Examination in a third attack showed that the anterior tibial muscle responded with 20 milliampères on both sides, the posterior tibial with 12 milliampères on the right side and with 40 milliampères on the left, the erector spinæ with 20 milliampères, the abdominal muscles with 16 milliampères, the biceps, triceps, extensors, flexors, and deltoid responded with currents varying from 30 to 40 milliampères.

In the fourth examination during a mild attack the following conditions were found :

	Right.		Left.	
No contracture with	15	Anterior tibial,	15	No contracture with
	10	Posterior tibial,	8	
	10	Rectus,	18	
	15	Biceps,	15	
	20	Gluteus,	20	
	20	Erector spinæ,	20	
	41½	Flexors,	7	
	6	Extensors,	15	
	10	Triceps,	10	
	10	Biceps,	8	
	12	Pectoralis,	12	
	8	Rhomboid,	8	
	7	Sternocleidomastoid,	8	
	14	Supraspinatus,	12	
	12	Infraspinatus,	7½	
	3	Facial,	4	
	15	Deltoid,	12	
	15	Abdominal rectus,	15	
	15	Lumbar,	15	
	14	Latissimus dorsi,	14	

Biceps and anterior muscles responded very slightly to the greatest amount of current obtainable in a faradic battery, while the rectus and posterior tibial muscles responded fairly well on the left side. The posterior tibial and rectus on the right side reacted better than the biceps and the anterior group on the right side. The flexors of the arms contracted much more readily than the extensors, the biceps more readily than the triceps; the deltoids responded fairly well, the pectorals much more readily, the abdominal muscles only slightly; the infraspinatus responded fairly on both sides. No movement was obtainable in the supraspinatus on either side. The rhomboid muscles contracted quite well.

Median nerve transmission was 15 milliampères right and left. In order to lessen skin resistance as a factor, examination was also made with the limb immersed in water, but this did not seem to diminish the amount of resistance offered by the muscles to the faradic current.

During a profound attack, in which it required from 20 to 30 milliampères, CA. CL. C. being greater than AN. CL. C., to develop contraction by the usual method, when a large electrode was placed upon the sacral region and a gold needle inserted deep into the body of a muscle, it was found that fair contracture could be induced with 8 milliampères, CA. CL. C. greater than the AN. CL. C., interrupting current at the needle insertion into the muscle. On repeating this experiment upon a healthy person it was found that less than half this amount of current was required to evoke contraction in his muscles.

There has never been at any time any suggestion of reversal of the poles; C. CL. C. has always been greater than AN. CL. C. in these examinations.

When the nerves were tested the same lowered irritability was observed—that is to say, if it took 20 milliampères to induce contraction in a group of muscles, no less was required to bring about contraction when the nerve was stimulated.

Upon examining the patient during the interval and a few hours after the paralysis had disappeared, it was found that the muscles responded normally to faradic and galvanic currents, and that nerve transmission was in no way interfered with. This was repeatedly confirmed.

All these are elaborately detailed, because of the interest which attaches to the very absence of all possibility of stimulation, but may be summed up by saying that during the attack, if it approached at all to completeness of loss of power, no electrical reaction was present to any current which it was possible to use upon a living human muscle, and even when the skin was pierced and electricity applied directly to the muscle a current very much greater than that which would move a muscle in normal condition was required to produce contraction.

The examination of the urine has been most painstakingly made for me by Dr. A. E. Taylor, at the Pepper Clinical Laboratory of the University of Pennsylvania, and his report is as follows:

Urine of Period of Attack, 935 *c.c.*

Total nitrogen, 13.749 g.
Urea, 24.510 g.
Urea-nitrogen = 83 + per cent. of total nitrogen.
Uric acid, 0.526 g.
Xanthin bases, 0.283 g
Total phosphates, 1.414 g. P_2O_5.
Alkaline phosphates, 0.574 g. P_2O_5.
Earthy phosphates, 0.840 g. P_2O_5.
Total sulphates, 1.356 g. SO_3.
Preformed sulphates, 0.140 g. SO_3.
Ethereal sulphates, 0.216 g. SO_3.

Urine of Interval, 1610 *c.c.*

Total nitrogen, 9.397 g.
Urea, 18.490 g.
Urea nitrogen = 82 + per cent. of total nitrogen.
Uric acid, 0.194 g.
Xanthin bases, 0.142 g.
Total phosphates, 1.306 g. P_2O_5.
Alkaline phosphates, 0.494, g. P_2O_5.
Earthy phosphates, 0.812 g. P_2O_5.
Total sulphates, 0.695 g. SO_3.
Preformed sulphates, 0.546 g. SO_3.
Ethereal sulphates, 0.139 g. SO_3.

Urine of Period just following an Attack, 1725 *c.c.*

Total nitrogen, 16 332 g.
Urea, 31.111 g.
Urea-nitrogen = 88 + per cent. of total nitrogen.
Uric acid, 0.297 g.
Xanthin bases, 0.090 g.
Total phosphates, 3.084 g. P_2O_5.
Alkaline phosphates, 1.999 g. P_2O_5.
Earthy phosphates, 1.085 g. P_2O_5.
Total sulphates, 2.174 g. SO_3.
Preformed sulphates, 1.975 g. SO_3.
Ethereal sulphates, 0.199 g. SO_3.

Urine of Period of Attack, 1550 *c.c.*

Total nitrogen, 7.247 g.
Urea, determination spoiled.
Uric acid, 0.103 g.
Xanthin bases, 0.0214 g.
Total phosphates, 1.783 g. P_2O_5.
Alkaline phosphates, 1.163 g. P_2O_5.
Earthy phosphates, 0.620 g. P_2O_5.
Total sulphates, 0.652 g. SO_3.
Preformed sulphates, 0.561 g. SO_3.
Ethereal sulphates, 0.089 g. SO_3.

Each set of analyses comprises the figures for the urine of twenty-four hours. The first two sets were done in the period when the patient was upon milk diet; the last two were done while the patient was upon a mixed diet.

The total nitrogen and the urea, as well as the ratio between the urea-nitrogen and the total nitrogen, were within normal limits, in consideration of the diet.

The quantities of uric acid were, with the exception of the first analysis, notably low. There was, however, no constant relation; the highest and lowest figures were gotten for the urine voided during attacks, while the figures for urine voided between the attacks lie between them. Such fluctuations may, however, be seen in the urine of healthy people.

The xanthin bases were in three of the four examinations excessive. In the urine of the last attack, however, the quantity was entirely normal. Such a quantity as 0.090 g. may often be seen in various diseased states, but figures such as 0.283 g. are rarely seen outside of leukæmia. Whether the quantities of uric acid were small because the xanthin bases were eliminated as formed and not oxidized to uric acid cannot be shown.

The elimination of total phosphates was within the normal limits. In the first two analyses a reversion of the normal ratio between the alkaline and the earthy phosphates was determined; in the last two analyses the ratios were normal. This reversion of the ratio between the alkaline and earthy phosphates is considered by Gilles de la Tourette to be diagnostic of hysteria. It is, however, found in very few cases of hysteria in this country.

The total sulphates were in all analyses within the normal limits. The normal figures for the preformed sulphates indicate that the proteid metabolism was normal. The quantities of ethereal sulphates were low. The diet and the colonic lavage obviously have tended to limit the formation of the ethereal sulphates, and the figures certainly indicate that there was no excess of proteid decomposition in the alimentary tract.

The urine of twenty-six days, including three attacks, was carefully tested for ptomaïnes, alkaloids, and alkaloidal substances by the Brieger and the Baumann-Udransky methods. No trace of such substances could be detected. These tests do not reveal bacterial toxines in the true sense of the term, and a rôle on their part in the case cannot be excluded.

The urotoxic coefficent (determined according to the Bouchard method, except that the injections were done under slight ether narcosis into the jugular vein) was below 0.536 for the urine voided during the attack and below 0.557 for the urine voided between the attacks—I say below, because in each case the injection was stopped at a point when the rabbits were apparently dying, but in each instance the animal recovered. In consideration of the diet, of the fact that the man was in bed, and that the injections were made into the jugular vein, the urotoxic coefficients were normal. The close approximation of the coefficients in and after the attack is striking, and speaks against regarding the seizures as corresponding to variations in the urinary toxicity. As a matter of fact, the Bouchard procedure is crude, and under all circumstances furnishes results of doubtful value. I do not believe the negative results in these injections can be taken as a serious consideration against the view that the seizures may have a toxic cause. Chemical and bacterial studies of the feces during and after several attacks gave wholly negative results, which it is not necessary to detail.

Studies of the blood under the microscope revealed little or no changes. No malarial protozoa could be found in any form. With stained slides the relative proportions and staining reactions of the different elements were found unaltered. Counts of the red and white corpuscles gave normal results, and the percentage of hæmoglobin was always high, never having been found below 90.

I asked my friend, Dr. Alfred Stengel, to repeat these examinations, which were made by myself and by my hospital assistants, that I might have the advantage of an authoritative opinion, and to undertake some experiments to determine the toxicity of the blood-serum. In bleeding the patient, to secure the necessary amount of blood for these experiments, a remarkable difficulty was experienced. When the median cephalic vein was opened during an attack the flow of blood was so slow and so small that we could hardly secure the six ounces we wanted. Thinking the opening in the vessel had not been large enough, on another occasion we cut the vein right across, but with scarcely a better result. The patient's heart-action at the time was, as usual in the paroxysms, rather rapid and feeble, with lowered pulse-tension, and on the occasion when we abstracted the full six ounces he felt decidedly light-headed before the bleeding ceased.

Dr. Stengel's report is as follows:

"*November* 22, 1898. 1. Five c.c. of serum from blood drawn during an attack injected into rabbit weighing 1550 grammes at 4.30 P.M. Was well at 6 P.M.; died during the night. Post-mortem showed abundant hemorrhages at base of right lung; less at left base. No other changes of a definite sort.

"23*d*. 2. Injected with same serum, 2¼ c.c., rabbit No. 2. One hour after: Red corpuscles, 5,012,000; white, 9800. Twelve hours later: 6,000,000 red cells and 11,550 white.

"*April* 28, 1899. 3. Injected 5 c.c. of serum into rabbit weighing 2250 grammes. Rabbit alive after forty-eight hours.

"4. Injected 9 c.c. into rabbit weighing 2150 grammes. Died in thirty-six hours."

These, like the examintions of the secretions, may be said to give negative results, and certainly do not indicate any unusual degree of toxicity in the blood.

The consistency of the manifestations in the attacks is remarkable. In twenty-five attacks observed the only difference was in the degree to which power was lost, the more or less total disappearance of reflexes, and the varying occurrence of certain changes in heart-action and pulse-tension.

Almost all of the eighteen or twenty cases observed by various writers in Europe and in this country have presented symptoms very closely alike. In almost all paralysis has been periodic in its occurrence;

generally there have been instances among relatives of the sufferer; in none have any sensory changes been found, and in those in which electrical study has been made electrical changes which greatly resemble the ones here described have been present, and in the intervals of the attack the patients almost invariably give the same history of complete and perfect strength and soundness.

I say that in all the cases there have been practically no sensory changes. One described by Fischl had distinct impairment of sensibility. This case is in other ways a rather doubtful one, and might perhaps be excluded from the list.

Oppenheim and Hirsch both describe temporary slight increase of cardiac area, and both have observed murmurs upon which the diagnosis of probable mitral insufficiency was founded, a condition which lasted only during the paralysis and disappeared rapidly with the loss of power.

In one of Goldflam's cases irregularity was observed and a faint, systolic basic murmur. In mine, as has already been indicated, there was a murmur, limited to the left edge of the sternum, and best heard at the pulmonary area. This condition has varied very much in the different attacks, but this is the one which is the most common. As a rule, J.'s heart is faster in the attacks than out of them, in spite of the complete absence of muscular movement. A slight accentuation of the second sound with a tendency to splitting is present even in the intervals.

The examinations of the blood, feces, and urine have been made in most careful and detailed manner, and the results herewith call but for one comment—namely, that most minute study has revealed no fact of importance in any of them, and in the two or three cases in which these points have been thoroughly gone into, almost equally little has been learned from the examinations.

As to treatment, it may be readily supposed that this has been experimental. For several weeks during the early observations J. was not given any medicine, but led a perfectly regular and wholesome if somewhat inactive life. This was thought advisable, in view of the fact that several cases have described their paralyses as brought on by overexertion. No such cause could be assigned in the present instance, as for some weeks he lived in the hospital ward and moved about the building freely, taking the ordinary liberal house diet and being under close observation. The first theory which suggested itself, as it has to other observers, was that the trouble had an autotoxic origin. In order that there should be no retention of feces in the intestinal canal to favor this the colon was carefully washed out every second day. During this period attacks occurred exactly as regularly as they had before he came to the hospital. He was then put to bed and kept upon milk diet; the colon washing was continued, and various intestinal antiseptics were used. The attacks recurred with about the same interval as before. He lost a little weight upon this treatment, during which also massage was used, for the sake of keeping up his circulation and of anticipating the impairment of digestion from inactivity. It was during this time that the first studies of the urine were made by Dr. Taylor, and his examination showed one of the effects of colon lavage in the absence or lessening of the ethereal sulphates. Finding the paroxysms recurring as before, he was allowed to get up and move about a little, but the amount of milk was increased, and soon after he was returned to a house diet. At this time the later examinations of the urine were made. No evidence having been secured from the urinary and fecal examinations of any toxic condition, intestinal antiseptics were stopped and an attempt was made by the use of full doses of strychnine to stimulate the spinal cord, upon the secondary assumption that this might be the source of the disturbance. Full doses of strychnine were given and rapidly increased, and if any change took place in the patient, it was that the attacks appeared at rather shorter intervals than before. Strychnine had a very decided effect upon him, and it was not long before it had to be stopped. For a time he was left without any treatment, with orders to the hospital people to occupy him as much as possible and to let him go out every day for a walk. No decided difference in the frequency of paroxysms appeared under this regime, and for a time under no treatment at all the attacks, without evident cause, grew somewhat more frequent and recurred several times with only three or four days' intermission. Bromide was then given, and the first week of its administration in doses of twenty grains three times a day there was no "spell," although just previously the intervals between the attacks had been, at the utmost, four days. He was rather long in the next seizure, which was a very complete one, and when he recovered from it he had a week during which the knee-jerks were irregular—sometimes absent, sometimes slightly present—and in this whole period the patient felt dull and not so strong as usual upon his feet.

Little as we have discovered of any unusual condition of the blood, feces, or urine in this case, it seems to me impossible to attribute the attacks to any other than a toxic cause, even in face of the negative results of the chemical studies. The analogy is sufficiently striking to some other autotoxic, or partially autotoxic, disorders, in spite of the want of direct findings to support this view, and in spite of the fact that some aspects of the case are against it.

In migraine, for example, we have an instance of a disease in which family tendency is strongly evinced, which usually begins at about the age of puberty and lessens or disappears in middle life, which occurs paroxysmally and often at fairly regular intervals. The manifestations of migraine are largely cerebral, and those of the disorder we are considering appear in the spinal centres and peripheral nerves and muscles.

As to other possibilities, it has been variously suggested that, as in the cases described by Higier, and lately in Philadelphia by Dr. J. W. McConnell, the attacks are the paralytic equivalents of epileptic fits. But in the instances where paralytic seizures have replaced epileptic paroxysms no alteration in electrical reactions have been found, so far as I know, nor any loss of reflex and direct muscular irritability, nor are heart-murmurs produced. The perfectly clear mind of the patient throughout the attack is also against this supposition, and so is the long duration of the palsy.

The suggestion of hysteria is scarcely necessary to discuss. The altered electric reactions, the absence of reflexes, and the perfectly well-balanced, wholesome moral tone of the patient at once negative this.

A poison, or more than one poison, formed at intervals or constantly formed and gradually accumulating, and acting severally upon the heart and vessels, the spinal centres, as shown by the sexual excitement, and upon peripheral nerves and muscles, is the most warrantable conclusion. It is difficult to imagine one toxic material which should have all these effects; but certainly no one could study this boy's state and not have poisoning suggested to his mind. The heavy breath, the coated tongue, the comparative suppression of urine during the attack, with an unusual flow after, all carry out the analogy to migraine. If one poison might act upon both spinal centres and peripheral nerves and muscles, it is, perhaps, not too fanciful to account for the heart conditions by supposing that the resulting total flaccid palsy may extend to the muscles of the arterial system, and that this relaxation allows of so much dilatation of the great vessels as to favor the production of a murmur.

Some additional testimony to a special action of the poison upon the cord may be drawn from the examination of the patient's mother, in whom there was distinct, if slight, enfeeblement of function in the lower spine.

On the whole, upon due consideration of all the cases that can possibly be included in periodic family paralysis, it appears to be a warrantable conclusion that two poisons are formed, one of which predominates in some cases, another in other cases; according to the predominance of one or the other, the effect is greater upon the peripheral nerves and muscles or upon the spinal centres. The disease is remarkable in this that it is clinically a most distinct entity, that all observers agree in their statements of the vast majority of symptoms, and that up to the present time the causation and pathology of the affection remain in absolute darkness.

KRAUROSIS VULVÆ:*

A DISEASE OF CHRONIC INFLAMMATORY NATURE AND CHARACTERIZED BY CUTANEOUS ATROPHY, WITH MARKED SHRINKING AND CONTRACTION OF THE VAGINAL ORIFICE.

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This exceedingly interesting and fortunately rather rare disease was first brought prominently to the attention of the medical profession by the classical article of Breisky,[4] published in 1885, in which he described at length twelve cases, and presented a clinical description of the condition which can scarcely be improved upon at the present day.

Ten years before that time, in 1875, Dr. Robert F. Weir,[1] of New York, described, under the name of ichthyosis, a condition of the vulva which, in its clinical characteristics, closely resembled kraurosis. Lawson Tait[2] seems to have noticed cases of a similar nature at about the same period that the article of Weir first appeared, which he then described as "serpiginous vascular degeneration of the nymphæ." But it was not until the observation of Breisky[4] that the disease was first looked upon as a distinct entity, apart from pruritus and the not uncommon senile atrophy of the vulva.

Clinically, the picture of this disease is most striking. The first symptoms noticed are usually those characteristic of pruritus, which consist of an intense and more or less progressive itching and burning of the vulva. In some cases the affected tissue is excessively hyperplastic and dyspareunia develops early. The skin is frequently discolored, and small red spots appear on the surface. Some time after these symptoms are noticed a peculiar shrinking of the superficial tissue of the vulva begins to take place. Discolored spots appear which are hyperæsthetic. The skin becomes dry and whitened, and often covered with a rough and thick epidermis.

The disease may be unilateral or circumscribed, but usually the tissues of the labia majora, the nymphæ, the area about the clitoris and urinary meatus all become more or less involved, while the skin about the anus is frequently affected. As the disease advances the small labia gradually disappear, fusing with the labia majora, and the skin becomes shiny and drawn smoothly over the shrunken clitoris, which has apparently retracted behind the skin, and is now only indicated by a small depression instead of a prominence. Underlying vessels are frequently seen through the transparent epidermis, and cracks appear on the dry surface, which extend often into the corium. A sensation of drawing and shrinking of the vulva is usually experienced, and the vaginal orifice becomes gradually narrower and more and more contracted, until frequently the little finger can scarcely be introduced, and all sexual intercourse becomes a physical impossibility. When this condition has been reached the pathological process is arrested, the subjective sensation of shrinking passes away, and the symptoms of pruritus, usually prominent only in the earlier stages of the disease, are no longer experienced. But the shrunken and contracted vaginal orifice still persists, and is never spontaneously restored.

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* Read before the meeting of the American Gynecological Society, May, 1889.

That the disease occurs but rarely is shown by the fact that Fleischman,[5] who was especially on the watch for this condition in Breisky's clinic, in Prague, found only 8 cases in 1550 patients. On the other hand, Lewin, at the Charité, observed no case among 70,000 to 80,000 patients.

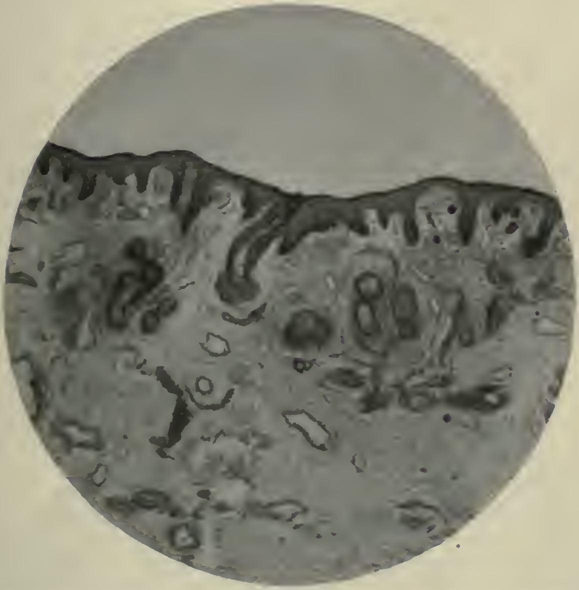
The pathological examinations of Breisky's cases, made by Fischels, form the foundation of our present knowledge. These researches showed the papillæ of the skin transformed into scar-like masses, the connective tissues of which were almost homogeneous, partly sclerotic, and without wavy fibres. The papillæ were, for the most part, low and varying in size, while the rete Malpighii was in places exceedingly thin. Sebaceous glands had disappeared altogether, and sweat glands were found to be almost entirely wanting. The microscopical examinations of Orthmann[11] in Martin's cases added still further to our knowledge of the pathology of the subject. He found some portions in a hypertrophic condition and other parts in a condition of atrophy. Under a thin horny layer the rete Malpighii was markedly narrow, some places showing but slight remains, the greater part of it having disappeared. The tissue of the corium had entirely lost its warty appearance, and was stretched and sclerotic. Here and there areas of small round-cell infiltration could be seen. The stratum Malpighii, outside the part of the true skin which was in a condition of hypertrophy, was atrophied. In other portions the horny layer was much wider, the cells being in strata of many layers upon a much-widened rete. The papillæ were much dragged out in width, and, like the corium, were more or less infiltrated with small round cells. Degenerative nerve processes were sought for, but not found, and, likewise, bacteriological examination proved negative. Up to this time, as Sänger points out, only the secondary stages of the disease had been described. The observations of Peters[16] are of especial interest, as he described the condition of inflammatory hyperplasia of the connective tissue, with a tendency to scar-like shrinkage, and inflammation and œdema of the upper layers of the epidermis, as well as degeneration of the elastic tissue. As a result of his researches he classified the disease among the diffuse connective tissue hypertrophies of the skin. In a case studied by Neumann the horny layer of the epidermis formed ribbon-like strips of wavy course, the cell nuclei being scarcely distinguishable. Nowhere was the stratum lucidum to be seen, while the prickle cell layer was perfectly prominent.

Longyear[26] made careful microscopical examination of several cases of kraurosis, and found bands of fibrous tissue below and entirely separate from the skin and mucous membrane, in the place of, and resulting from the destruction of, the subcutaneous and submucous cellular tissue. He believes that the pathological changes begin with a fibrous tissue formation in the subcutaneous tissue, and that the pathological changes in the skin are the result of the fibroid transformation in the underlying structure; that this new-formed fibrous tissue by contraction not only puckers the mucous membrane but strangles the blood-vessels.

The pathological examination of our own case is reported as follows: The specimens consist of several narrow strips of tissue which have been removed from the muco cutaneous surface of the vaginal orifice and hardened in 10 per cent. formalin solution. These have been mounted in celloidin, cut in transverse section, and stained with hæmatoxylin-eosin, by Van Gieson's method, acid fuchsin, carmine, and by Weigert's method for nerve-fibres. (See Figs. 3 and 4.)

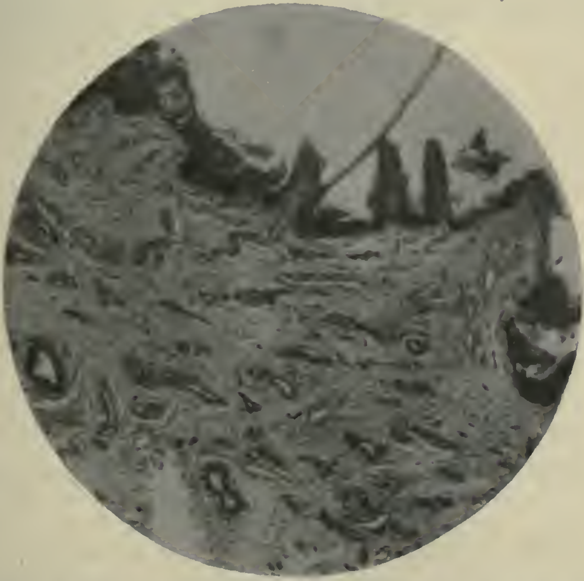
A general survey of the sections under the low power shows marked lesions both of atrophy and hypertrophy in different portions of the epidermis, with a general inflammatory condition of the corium and subcutaneous tissue. Examining now carefully the epidermis in detail, we note first that the stratum corneum, stratum lucidum, stratum granulosum, and stratum Malpighii can be differentiated with great distinctness in most of the thicker portions where hypertrophy is present, while in the parts where atrophy has taken place the layers are indistinctly blended together, the stratum lucidum can scarcely be discerned, and the stratum Malpighii fades away often to a mere thread. On the free surface of the epidermis, and so closely adherent to the stratum corneum that it appears as another layer, a blood-crust is seen. This crust is made up of red blood-corpuscles, the outlines of which are distinctly apparent in most parts, with a few leucocytes caught here and there among them. At intervals along the surface cracks, or fissures in the epidermis, are found, which usually penetrate the corium, and are often filled with blood-crusts (See Figs. 5 and 6.) Near the border of healthy tissue the stratum corneum appears normal or as a narrow band of ker-

FIG. 1.



Microphotograph of normal labium majus, showing numerous hair-follicles, sebaceous glands, and bloodvessels in the subepithelial tissue.

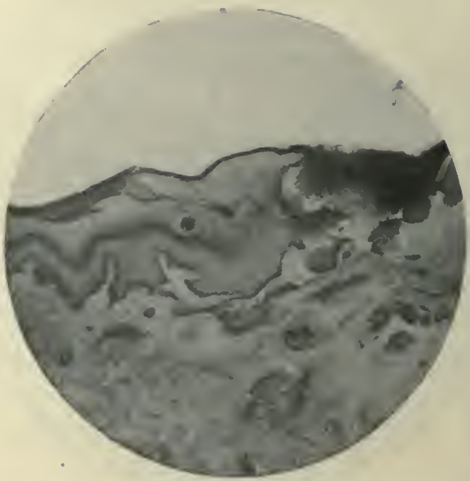
FIG. 2.



Microphotograph of normal labium minus, showing the subepithelial tissue rich in bloodvessels, elastic and muscular fibres, but entire absence of hair-follicles and sebaceous glands.

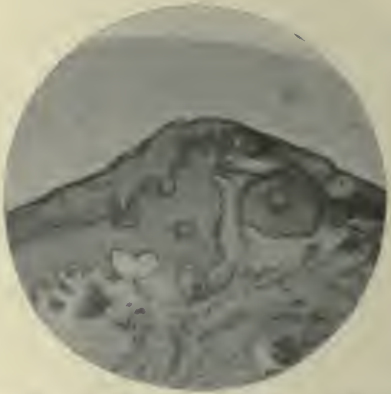
atinous tissue, with protoplasmic outlines indistinct, and with no nuclei. As we follow it into the diseased portion it becomes enormously thickened in some areas, and in other localities almost entirely disappears. No protoplasmic outline can be at all discerned, the hæmatoxylin stain is taken indistinctly, or not at all, and there is a marked tendency to the formation of whirls and twists resembling epithelial pearls. Free red blood-corpuscles are also occasionally present, and degenerate hair-

FIG. 3.



Microphotograph of labium, showing great hypertrophy of epidermis. (See Figs. 1 and 6. Blood-clot upon the surface, and entire absence of sebaceous glands and hair-follicles in the corium.

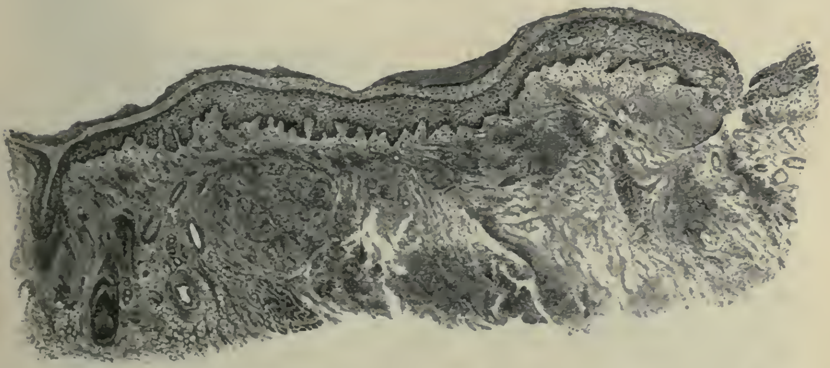
FIG. 4.



Microphotograph of labium, showing enormous hypertrophy of stratum corneum and stratum Malpighii; epithelial pearls in the epidermis.

follicles are discoverable, both in longitudinal and cross-section, the shafts of which are degenerate and often replaced by blood-cells. Keratin is seen here in great excess, the protoplasmic outlines are almost entirely lost, and the stratum corneum appears like a homogeneous fibrous band. (See Figs. 3 and 4.) The stratum lucidum can be studied best in the preparations stained by Van Gieson's method, since it selects the picric acid dye, and is readily traced as a slender thread in all sections where extreme atrophy has not been reached. The width of the rete layer varies considerably in different parts of the specimens. Over those portions of the corium where inflammation is actively present, with diffuse small round-cell infiltration and sclerosis, the Malpighian layer is flattened and drawn out, and the papillæ are broad and low, or wanting altogether. When, however, the inflammatory reaction is slight, small round cells appear, comparatively few in number, and the corium is but slightly altered; the papillæ are considerably elongated and more numerous, and long, finger-like processes of epithelium project between them. (See Fig. 5.) In all the fields where the extreme degree of atrophy has not been reached the individual cellular outlines in the Malpighian zone are sharp and distinct, pigment-granules are present in abundance, and the prickle cells are seen beautifully. The tissue beneath the epidermis furnishes us with a study of much interest. In some few places in the corium the delicate wavy outline of the elastic fibres is present, but in far the greater part a more or less extensive change is noted. The outer layers of the corium are

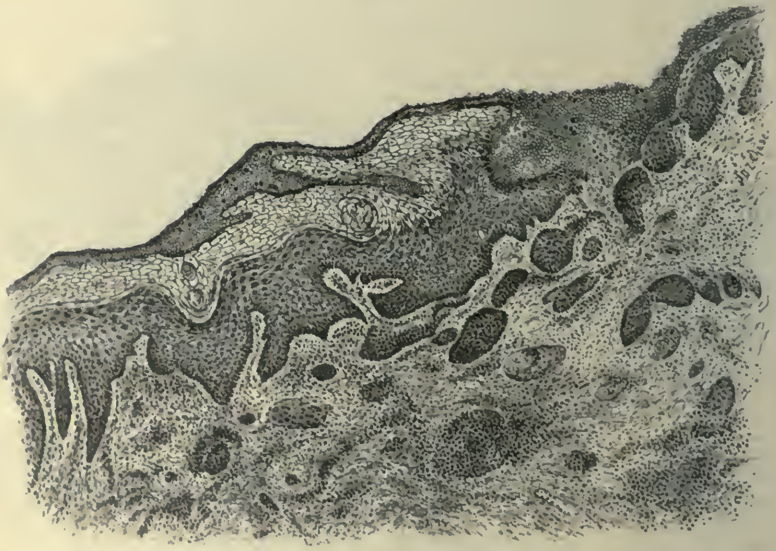
FIG. 5.



Showing hypertrophied epidermis, with blood-crust adherent to the surface; to the right fissure extending well into the corium. Hyaline transformation of outer portion of the corium, with entire absence of hair-follicles and sebaceous glands. In the deeper subepithelial tissue to the right, extensive areas of free red blood-corpuscles, with sclerosis of the elastic and muscular fibres; to the left, hair-follicles, bloodvessels, and bundles of muscular fibres in cross-section, with areas of small round-cell infiltration.

pale and slightly œdematous, the elastic fibres become indistinct, blend, lose their wavy outline, and become hyaline in character and matted together. Small round cells are found in large aggregations immediately beneath the epidermis, diffusely scattered throughout the corium and infiltrating the papillæ. In other places the corium appears dense and sclerotic, with scarcely any nuclei to be seen. The blood-capillaries have disappeared from the corium except in a few places, and no sebaceous or sweat glands can be found in any of the preparations. Areas of small round-cell infiltration extend deeply into the subcutaneous tissue, which also shows sclerotic changes. Here, also, hemorrhages have taken place, and free red blood-corpuscles are diffusely scattered through the loose stroma. Bloodvessels, fat, and unstriped muscle are present in normal amount. Points of special interest to be noted are the peculiar bundles that are found in the upper layers of the subcutaneous tissue. These can be seen both in longitudinal and in cross-section, and are well shown in the cut. (See Fig. 5.) While present in such numbers that it seems practically out of the question that they should be degenerate nerve-fibres, the histological resemblance is nevertheless most striking. The fibres are in distinct bundles, surrounded by dense fibro-elastic tissue, and on cross-section appear like nerve-fibres. The centre of each fibre is occupied by a dark round

FIG. 6.



Showing hypertrophied epidermis, adherent blood-crust on the surface; fissure extending through epidermis into the corium; and extensive round-cell infiltration in the subepithelial tissue. Hair-follicles and sebaceous glands entirely absent.

body whose appearance is almost precisely like that of the axis-cylinder. That they are not nerve-fibres seems to be proven by the fact that the supposed axis-cylinder takes the hæmatoxylin color when stained by Van Gieson's method; that upon cross-section the fibres are not exactly round, but fit against one another like muscle cells; that upon longitudinal section spindle-shaped nuclei appear; and that when stained by Weigert's method the result is not characteristic. In none of the sections can any trace of nerve-fibres be positively found, though most careful search has been made for them.

The etiology of kraurosis is a matter upon which, as yet, the writers upon the subject have not been able to agree or to come to a positive conclusion. Breisky, who saw twelve cases, only attempted a clinical and pathological description, and could furnish no valuable etiological suggestion beyond the fact that some of the patients suffered previously from a vaginal discharge, and that in a number of them the symptoms of pruritus were markedly present.

Jenowsky[3] reports six cases, in one of which sclerotic œdema had been previously present. In his cases he considered that a long-continued discharge and syphilitic ulcers had had a definite bearing upon the etiology. This author compares kraurosis with leukoplakia of the mouth and tongue, and with urethral stricture.

Orthmann[11] made careful microscopical and bacteriological examinations of five cases from Martin's clinic, in Berlin, and while contributing to our knowledge of the pathology of the disease, could add nothing as to the etiology. He failed to find degenerate nerve-filaments in the diseased tissues, and considered gonorrhœa and a leucorrhœal discharge, one or the other of which had been present in all his cases, as etiological factors. He also examined the urine carefully for sugar, but could find no trace of it.

Hallowell[9] placed kraurosis among the large and interesting group of chronic inflammatory diseases of the skin and mucous membrane, such as ozæna, psoriasis of the mucous membrane, chimney-sweeper's eczema, and others, all of which are characterized by hypertrophy and metaplasia of epithelium, a hardened corium, and a tendency to terminate in epithelioma.

Olshausen[25] mentions the fact that in certain cases the atrophic changes have followed the removal of the uterine appendages. Others have also mentioned this fact, and have sought to associate it with the atrophy of the genital organs brought about by an artificially induced menopause.

It is quite possible that the climacteric period may play an auxiliary rôle in the progress of atrophy, but that this is an important factor is doubtful. Many of the cases have occurred in women past forty, and, on the other hand, a number of Breisky's cases were observed in women who were pregnant, and Hallowell[9] describes one in a woman of thirty-three, whom he watched all through her pregnancy, and delivered at term without rupturing the perineum, although the skin surface of the vulva was extensively cracked and seamed.

Johnstone[20] describes kraurosis as trachoma of the urogenital canal.

Peters,[16] after careful microscopical examination, described the disease as a chronic hyperplasia of the subcutaneous tissue and corium, with a tendency to scar-like shrinking of the vulva. Attendant with and as a result of the subcutaneous atrophy, sclerosis and degeneration of the elastic tissue, the whole skin becomes involved with inflammatory œdema and atrophic lesions of the epidermis. But on the primary cause of the disease he throws no light.

Reed,[15] who re-introduced the subject of kraurosis five years ago, and presented a most complete description of six cases, together with the result of microscopical examination, suggested the term "progressive cutaneous atrophy of the vulva," on the supposition that the pathological lesions were confined to the skin.

As a result of the study of his own cases and the reports of others, he inclined to the theory that the disease of peripheral trophic nerve-filaments, or else the ganglia whence they originate, was the primary etiological factor. This, however, is a matter of theory and has no supporting evidence.

Longyear,[26] while advancing no positive opinion as to the etiology of kraurosis, nevertheless states that he does not believe the disease to be due to any local or constitutional disturbance outside the nervous system, and that the morbid process is due to defective nerve-action, probably reflex in origin.

Some writers have attempted to explain the origin of kraurosis in a previously existing specific lesion, but the large number of cases in which no syphilitic history can be traced, and in which venereal affections can be almost positively set aside, renders any serious consideration unnecessary. The testimony of Lewin,[22] too, who stated that he had treated between 70,000 and 80,000 women in his clinic at the Charité without ever seeing a case of kraurosis vulvæ, confirms the belief that this peculiar disease of the vulvæ is not of syphilitic origin.

Veit,[33] although himself having had but one case, reviews the whole subject in a scholarly article, and while exceedingly conservative in his statements as to what may be definitely proven in regard to the causation of the disease, nevertheless advances theories of etiology that are rational and deserving of careful consideration. In his opinion a close relationship exists between pruritus and kraurosis.

Recognizing in pruritus only a symptom, which by scratching is also able to produce an alteration of the skin of the vulva, in kraurosis he holds that we have to do with an essential alteration of the skin, and accords to it a distinct position among diseases.

In his argument, Veit first calls attention to the fact that in the majority of cases of kraurosis the symptoms of itching are noticed at the onset, and then attempts to explain the precise relationship which exists between this disease and pruritus. While pruritus is but a symptom, definite lesions of the skin usually develop secondarily, owing to scratching and irritation, although actual lesions may be entirely wanting. Again, among the various causes of pruritus he recognizes that which later on develops into kraurosis. On the other hand, under the symptoms of kraurosis, he gives a prominent place to the itching of pruritus, which is only present at the beginning, but may be present all through the disease. So much only he feels is definitely proven. Hypothetically, however, he goes much further. Using the demonstration that the actual lesions of the vulva in pruritus are secondary, due probably to scratching or pinching up of the skin, he reasons by analogy that we can readily imagine that there was in the beginning a catarrhal inflammation of the vagina or the urethra, or a qualitative change in the urine; that these caused the sensation of itching, which again caused scratching, and again the peculiar alterations of the skin of the vulva, which anatomically are classed with the chronic inflammatory processes.

After the disease has continued for a long time the sensation of itching and the alteration of the skin may also continue even after the original cause of the disease has disappeared. The skin alterations eventually become to a certain extent permanent, and are curable only by excision. He feels, further, that he takes small risk in saying that with an intense degree of alteration of the skin, of small round-cell infiltration, *i. e.*, inflammation, there follows a marked shrinking, whereupon we have before us the picture of kraurosis. That all women do not complain of itching, or have not complained before, who seek relief for kraurosis, he easily explains by their sense of shame and the fear of being held in contempt by the physician as a masturbator, so that a failure to report this condition is quite excusable. Kraurosis, then, he describes as an ennarrowment and shrinking of the vulva, which is brought about by an inflammation of the skin, which again is brought about after intense itching, by scratching. That all cases of pruritus do not pass on into kraurosis is explained by the fact that many patients seek treatment for pruritus, and a sufficient alteration of the skin is not produced to bring about shrinking.

Sänger and Martin both lay stress on the interdependent relations which exist between pruritus and kraurosis, while Martin[7] places special weight on its development out of a previously existing inflammatory condition. Sänger alludes to it as a senile and presenile atrophy of the vulva.

After a careful review of the literature and a thorough microscopical study of our own case we would ascribe to kraurosis an inflammatory origin, modifying but slightly the theories of Veit and Martin. While it is possible that primary lesions in the trophic nerve-filaments, or the ganglia whence they spring, may be the cause of the local manifestation, this is purely a matter of theory, with no evidence whatever to support it, and seems to us unreasonable and not borne out by the pathological investigations. Our own opinion is that the cause is entirely a local one. Pruritus is such a constant symptom in the beginning of the disease in nearly all instances that its etiological bearing cannot be ignored, and we agree with the hypothesis of Veit, that the itching induces scratching, which in turn sets up a chronic inflammatory condition, with the formation of cicatricial tissue in the deeper layers of the derma and subcutaneous strata, shrinkage and contraction of the vulva, and atrophy of the skin surface. We, however, recognize the fact that the larger number of cases of pruritus apparently do not degenerate into kraurosis; that there is, therefore, some hidden impulse which causes further changes than ordinarily take place with the symptoms in this disease, with which impulse we are as yet unfamiliar, seems likely. This element may be either constitutional or local. When once this element is brought into play in the presence of pruritus we would go still further and be more explicit in our explanation as to how this result is brought about. As is well known, the skin surface is the constant habitat of various micro-organisms capable of producing inflammation and even suppuration. On rubbing, or scratching, irritation is produced and the normal cellular resistance impaired. The micro-organisms are now able to set up a low-grade inflammation which easily extends into the corium and underlying subcutaneous tissue. The skin surface may, however, be broken and the micro-organisms introduced from beneath the finger-nail or from the clothing. The corium and underlying subcutaneous stratum, rich in elastic tissue and unstriped muscular fibres, become sclerotic and hyaline in consistency, lose their elasticity, shrink and contract. The bloodvessels are pressed upon and their calibres gradually lessened and destroyed, while the nerve-filaments are rendered first hyperæsthetic and then succumb. Primary hyperplasia, the result of irritation, gradually gives way to atrophy, until the entire thickness of the skin above the areas of scarred tissue are involved. When the entire area has become atrophic the progress of the disease is arrested and the condition remains stationary, and the vaginal orifice narrow .and contracted, but no further symptoms are manifest.

The atrophic process involves all the glands and appendages of the skin, so that the dry, glossy surface, dead-white appearance, and tendency to crack are readily accounted for. When this stage has been reached it is readily seen that the only treatment that can be of any avail is the total removal of all scar tissue and an approximation of the edges of the healthy skin and mucous membrane.

The treatment of this condition has been divided into palliative and curative. The former is simply to relieve the subjective symptoms, which at times are excruciating. Carbolic acid and cocaine afford temporary relief, but the symptoms return soon after with renewed severity. Tait mentions the soothing effect of a solution of neutral acetate of lead in glycerin, placed on cotton between the nymphæ. Johnstone advises a salve of yellow oxide of mercury in the early stages.

Pure nitrate of silver applied repeatedly lessens the suffering, but has no effect upon the progress of the disease. Hot water often affords considerable temporary relief. Heitzmann has practised curettement and scraping of the diseased tissue, but the result has been entirely unsatisfactory and the process a long and painful one, requiring very many repetitions.

Martin[17] was the first to suggest complete excision of the diseased tissue as a curative measure, and applied the method in five cases, four of which were permanently cured, and one experienced a recurrence. Others have since followed the same method, the results obtained by Reed, and published in the article above referred to, being particularly gratifying. To be completely successful total excision of the diseased tissue should be accomplished. If this is done the prognosis is most favorable. Recurrence has occurred in some cases when this was not obtained and when the operation was performed before the process of atrophy had been entirely accomplished.

The history of the following typical case is herewith presented:

The patient, aged forty-three years, married nineteen years, is the mother of one child, which is fourteen years old. Her labor was entirely normal, no instrument being used and no febrile reaction following. She never had a miscarriage.

Until the last four years she has been a well woman, although always somewhat neurotic.

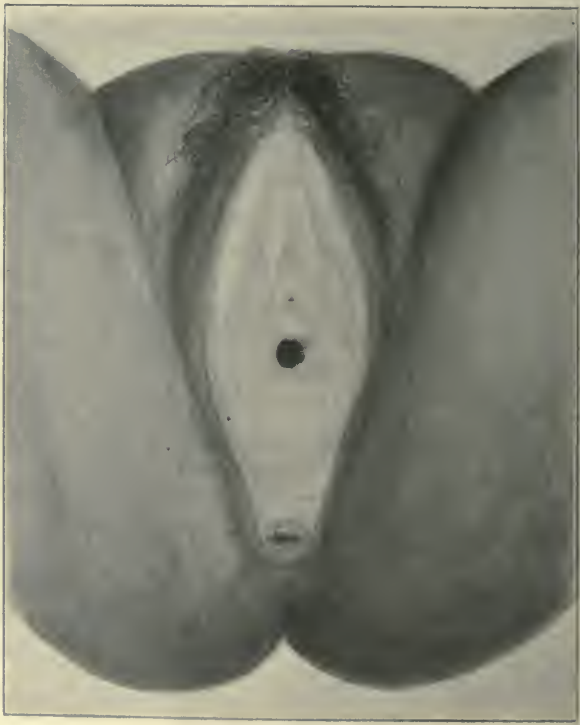
Four years ago she began to suffer from an obstinate itching about the vulva, which nothing could relieve permanently. Bathing with warm water gave as much temporary relief as anything, although all manner of washes and douches were tried by her physician. At times she suffered from a sensation of drawing and puckering about the vulva, which, however, lasted only a few hours, and then disappeared for a period of months. Her menstrual periods recur every four weeks, remaining for four or five days. The flow was free and accompanied by bearing-down pains which continued half a day. Some years ago she had a slight amount of leucorrhœa, but has had none whatever of late years.

At the present time she sleeps well and has a good appetite. She suffers somewhat from indigestion, resulting in gastric distress and abdominal distention after eating. Her bowels are regular in their action.

Urination at times is frequent, otherwise normal. There is a strong family history of pulmonary tuberculosis. Any possible venereal taint is easily eliminated. She is extremely nervous and excitable.

The patient was referred for treatment for an obstruction at the mouth of the vagina, which had been gradually increasing for some three or four years, and which had rendered sexual intercourse more and more difficult, until about two years ago, when it was abolished, not on account of any particular pain it caused, but because penetration became a physical impossibility. The contraction continued to such an extent that the husband and wife, as well as the physician in attendance, feared it might eventually become so complete as to prevent the escape of the menstrual flow. It was thought that possibly a tumor developing in the vagina might be the cause of the obstruction.

FIG. 7.



Showing affected area, with contracted vaginal orifice.

Repeated attempts at dilatation had been made by the physician in attendance, but all had resulted unsatisfactorily. The contraction progressed steadily. (See Fig. 7.) An examination of the parts affected disclosed the following condition:

Beginning in the mons veneris half an inch above the clitoris, and extending downward (in the form of an elongated oval) to just below the anus, the skin and muco-skin of the entire enclosure and perineum presented a dead-white appearance, almost as though it had been badly macerated.

All trace of the clitoris and the nymphæ had disappeared, and the labia majora were almost obliterated as such. No trace of the fourchette was found, and the vaginal opening was barely sufficient to introduce the tip of the little finger, and only then with considerable pain to the patient. At the vaginal opening the disease extended laterally from the vaginal mucous membrane for the distance of one-half to three-quarters of an inch. There were no local points of redness and no leucorrhœal discharge.

At this time the patient had no symptom whatever except the obstruction, and that, of course, was noticeable only when coitus was attempted. The itching and drawing feeling, which at no time had been prominent, had disappeared. There was no obstruction to the flow of urine nor to the passage of the bowels, although the disease extended completely about both the urinary meatus and the anus. Surgical treatment was decided upon, and the patient submitted to the following operation, with the object of obtaining a sufficiently patulous condition of the vulva to enable her to resume her marriage relations:

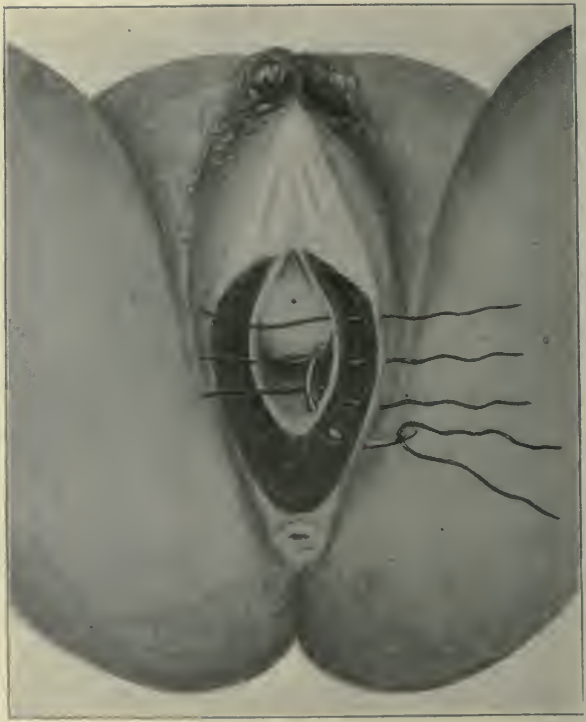
A strip of skin one-half to three-quarters of an inch wide, beginning at the level of the urethra on one side and extending around the complete circumference of the vulva to the level of the urethra on the opposite side, was excised. The innermost edge of this strip followed the line of juncture of the vaginal mucous membrane throughout, there being a fairly sharp line between the healthy vaginal mucous membrane and the diseased tissue outside. Laterally, the strip was sufficiently wide to include all the diseased area, but as the incision circled around onto the perineum, between the vulva and anus, the strip, although it widened, could not be made to include all the diseased area, as this extended to below the anus. The incision was, however, carried as near the margin of the anus as possible.

The knife was now passed directly into the septum between the vagina and rectum, through the denuded area to the depth of an inch, and the tissues freely incised laterally, with the object of cutting the muscles. The effect of this was to produce practically a partially torn or relaxed perineum, with a more or less gaping vulval orifice. The cut edge of the mucous membrane of the vagina and the skin were now readily brought together by interrupted silkworm-gut sutures, supplemented (see Fig. 8) by a continuous suture of fine silk. The object of this double suture of fine silk was to secure an accurate approximation of all incised edges, and to ensure the more certainty against any tearing out of the sutures when the vaginal plug, which it was proposed using, was inserted in the vagina.

A large glass plug two inches in diameter was then passed into the vagina and held in place by a T-bandage. The following day, on account of the tension of the stitches, this plug was replaced by a smaller one.

The plug was removed twice daily, and vaginal douches of boric acid administered each time. Union of the stitches being completed, they were removed at the end of ten days. The bladder was catheterized each time the plug was removed. Gradually the patient was taught how to introduce the plug, and on returning home at the end of three or four weeks was given a hard-rubber plug one inch and a quarter in diameter, with instructions to introduce this twice daily, lie down, and allow it to remain an hour each time. After several months the introduction was reduced to once a day, and was finally withdrawn altogether. Just before allowing the patient to omit the daily introduction of the vaginal plug a letter was received from the husband relative to some irritation about the urethra, which was evidently set up by the frequent introduction. We quote the first few lines of this letter:

FIG. 8.



Showing denuded area and approximation of healthy skin and mucous membrane.

DEAR SIR: I wanted to write to you before now, but put it off from time to time. As far as sexual relation is concerned, Mrs. ———'s operation is a perfect success . . .

Yours truly,

The whole subject of future contraction is open to discussion, but we feel confident that such will not take place in this instance, for the disease had apparently reached its height, and had come to a standstill. But whether or not this be true, all the diseased area laterally was dissected away, and healthy skin and healthy vaginal mucous membrane united. It is true the tissue about and above the clitoris is involved, as is also that about and below the anus, but it will be impossible for any amount of contraction at these points to affect the vaginal opening. The only danger to be feared will be the future involvement of the now healthy vaginal mucous membrane and skin, which have become united.

The patient will be watched with great interest. The possible future contraction of both the urethral and anal openings has been considered. Should either or both occur, a similar line of treatment to that carried out in the case of the vaginal opening will be adopted.

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THE IMMEDIATE AND REMOTE EFFECTS OF ATHLETICS UPON THE HEART AND CIRCULATION.[1]

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During the past six years I have had frequent opportunities of examining athletes competing for positions and playing upon the various teams of the University of Pennsylvania, and have made studies, as far as was possible under the circumstances, to determine the effect of athletics upon the size and efficiency of the heart and the character of the circulation. It has not been possible for me to carry out elaborate investigations into the manner of production of the various phenomena which attend exercise, and I shall not enter upon any discussion of this aspect of the question now. In outlining the heart of patients or athletes, I follow a method more or less like that used by Sansom. After carefully mapping out the heart's borders by percussion and auscultatory percussion, I mark these borders with a brush dipped in oil, and similarly mark the middle line of the sternum, indicating the suprasternal notch by a V-shaped figure at the top, the ribs (by broken lines), and nipple and position of the cardiac apex by a circular and a crossed figure respectively. A piece of soft tissue-paper is then pressed over the chest, and in this way the outlines are secured in their exact size. The tracings which I present here are exact copies of such outlines upon heavier paper.[2]

In watching the effect of training upon the heart, my attention was first directed to the ease of development of a systolic murmur over the heart. This occurred in the late summer of 1893, when I spent some time with the candidates for the football team during their preliminary training. The men who were candidates had for the most part been resting, and were, therefore, out of condition. I noticed that a systolic murmur over the body of the heart was not unusual, and in a special trial of nine of the candidates I found that three promptly developed a very evident murmur of the kind after a little exertion. During the subsequent fall term I tested the same men while in actual practice, and found that the murmur, before so readily produced, did not show itself.

This led me to study the conditions of the heart immediately before and after exercise more carefully, the method employed being to map out the borders of the organ as already detailed just prior to some athletic sport, and again immediately after the exercise.

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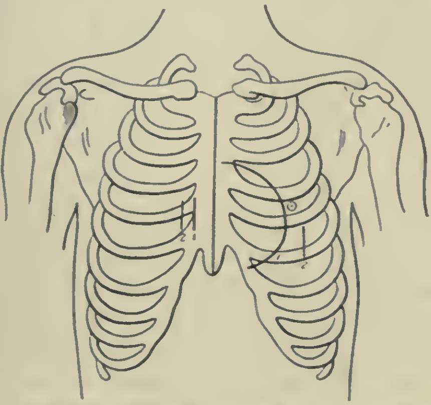
[1] Read at the meeting of the Association of American Physicians, May, 1899.

[2] The cuts are reduced representations drawn to scale.

Of a number of charts a few may be taken as typical. The two I exhibit first were prepared from young men rather new at athletics.

Chart I. was taken from a boy aged nineteen years who had not previously trained for any form of sport, and who was now engaged in one-half mile running. The chart exhibited represents the position of the left and right border of the heart before and after a trial run of one-half mile. Before the race the sounds at the apex and over the body of the heart within the apex were normal, excepting for a certain deliberateness of the first sound. The pulmonary sound was, perhaps, a little accentuated. There was a suspicion of murmurishness of the first sound toward the base of the heart. After the race the apex-beat was quick and circumscribed, and there was a distinct, diffuse thrill over the apex and in the epigastrium. Auscultation discovered a slight systolic puff, and the second pulmonary sound was distinctly accentuated. The murmur was localized in the region of the apex.

CHART I.

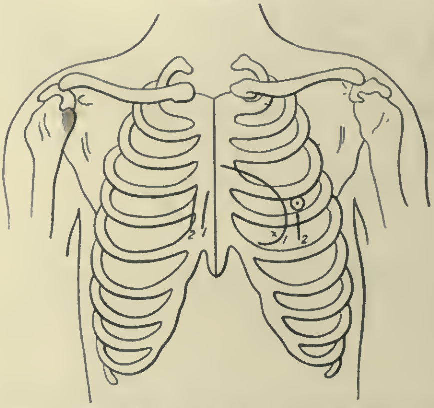


Illustrating position of the right and left borders of the heart before (1) and after (2) running one-half mile.

Chart II. was taken from the chest of a young man aged twenty-two years, a half-mile runner. Before the race, at which time this chart was prepared, the heart-sounds were found to be normal, though perhaps a little quick and irritable. After the exercise a distinct systolic thrill was found at the apex. The first sound of the heart was murmurish, but the relative values of the first and second heart-sounds at the pulmonary area were retained. These two charts illustrate very strikingly the effect of exercise upon the heart in comparatively untrained young men.

As contrasts to these I select the next two, which were prepared from trained athletes.

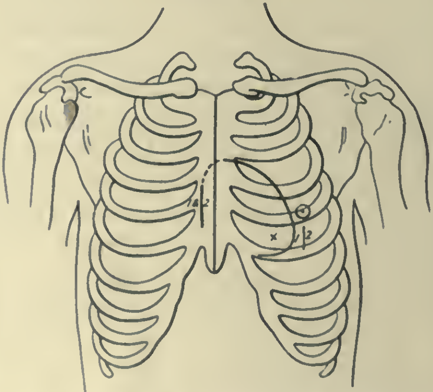
CHART II.



Borders of heart before (1) and after (2) one-half mile run.

Chart III. was taken from a walker, aged about twenty-three years, who had engaged in active athletics for a number of years, and who was unusually sturdy, walking in remarkable time a mile or more, without any of the evidences of fatigue so commonly observed after this sport. On the occasion on which this chart was prepared, Mr. F. showed at the preliminary examination a strong and circumscribed

CHART III.

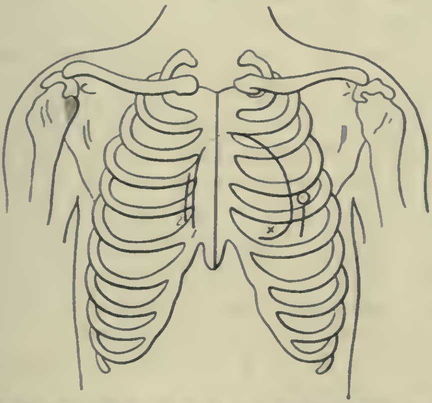


Borders of heart before (1) and after (2) three-quarter mile run.

apex-beat, with a long and very muscular first sound, but without a murmur. At the pulmonary area both sounds were distinct. There was a suggestion of a thrill on palpation over the apex. After walking three-quarters of a mile in very rapid time the apex-beat was found to be violent, and on palpation there was a rather more distinct thrill. The first sound was sharp and strong, but muscular, and there was a puffing systolic murmur heard over the pulmonary area, and accentuated by breathing, but the second sound was not particularly accentuated in the pulmonary area. The chart is mainly interesting in showing the right border of the heart exactly in the same position before and after exercise, though the entire organ seemed to be somewhat hypertrophied.

Chart IV. is that of a young man of remarkable physique, the holder of three world's records. The chart exhibited was taken after sprinting and hurdling. Prior to the exercise there was a systolic murmurishness at the apex, but no distinct murmur. The pulmonary second sound was about normal. The aortic second sound was a little accentuated. After the exercise there was a suggestion of a thrill in the region of the apex, and possibly also in the epigastrium. There was no murmur, but the pulmonary second sound was a little accentuated. In this case the right border of the heart was little affected by the exercise.

Chart IV.



Borders of heart before (1) and after (2) sprinting and hurdling.

These charts are sufficient to illustrate the changes in the outline of heart as obtained by percussion and auscultatory percussion after exercise. I cannot now enter into a discussion of the causation of these changes, but should like to refer briefly to one or two points of interest. It has been demonstrated by physiological experiment that muscular exercise causes a fall in the blood-pressure in the peripheral vessels, and probably a dilatation of these vessels. Under these circumstances we should not expect an increase in the size of the heart, and increased intracardiac pressure as a result of strain. It does seem, however, that in the beginning of exercise there is a temporary increase in pressure at the centre. It has long seemed to me that the phenomenon known among athletes as "second wind" was to be explained by the recovery of the right ventricle after the preliminary overdistention incident to exertion. I had not seen this view expressed until within a few days, when my attention was called to the recent article by Dr. Allbutt, in his *System of Medicine*, vol. v. I quote from this article (p. 849): "The dilatation is, I think, concerned in 'second wind'; the healthy heart increases its out-put, the lungs expand, resistance falls, the right ventricle pulls itself together, and second wind is established. This process, trying enough to an unsound or defective heart, to young boys and to elderly men, is to the healthy heart of comparatively young adults perhaps never injurious." This expresses my view of the case exactly, a fact which is all the more gratifying to me because Dr. Allbutt's views are based upon observations of under-graduates at Cambridge, as mine have been upon students in Philadelphia. It seems to me not unlikely that the size of the right ventricle depends upon the degree of recovery of the right heart after the first distention. I cannot, however, agree entirely with Allbutt in the statement which follows immediately after what I have quoted: "I have many times seen under-graduates and others look ghastly at the end of a long spurt of exercise, but I never saw a sound young man the worse for a temporary stress of this kind; if, as in a few cases which I have seen again and again in growing youths, dilatation of the heart occurs, leading to cyanosis, panting, confusion, or vertigo, this oppression is generally sufficient of itself to stop the exercise in time." Of course, all of us who have had occasion to observe athletic sports of any kind have seen instances of the sort alluded to in the sentence just quoted, but I have seen a few cases in which recovery was not as prompt as is intimated, and in which, though the normal condition was restored after a short interval, it seemed to me that some sort of permanent damage must have been done, though I could not demonstrate it. I may cite, for example, the case of a young man playing football, who was in superb physical condition, and had never been hurt or disabled in any way, and who, on the occasion of a trying game, both physically and mentally, suddenly collapsed toward the end of the game. I had repeatedly examined him prior to this time, and within a day or two had outlined his heart and other organs. I saw him immediately after his attack, and found him bleeding at the nose, more or less cyanosed, and with a weak, fluttering pulse. On examination of his chest I discovered that both sides of the heart had become enlarged, the increase in size toward the left and right being fully three-quarters of an inch or an inch. The man was prostrated, and did not recover any sort of control of himself for some hours. He then became rapidly better, and after a few days was seemingly quite well. He did not engage in football for ten days, but at the end of that time resumed practice and regular play without any apparent evil consequences.

A case of similar nature is the following:

W. R., aged nineteen years, weighed 122 pounds during the winter of 1897. During the spring and summer he rode a bicycle excessively, frequently riding twenty-five miles in the evening after his day's work. His weight declined to 109 pounds. In August he went to the seashore, and while bathing his strength was overcome by too much exertion at swimming, and he began to expectorate blood. The next day, and during several days of the following week, there were repeated hemorrhages of the same sort. The total loss of blood was not very great, however. There was at the same time shortness of breath and cough on the very slightest exertion. The heart became intermittent and very tumbling in action, and both sides increased in size; the left border being in the nipple line, the right border beyond the right border of the sternum. There was no murmur even after exertion, when I examined him some time after the onset; the second pulmonary sound was a little accenuated. In this case, of course, the patient had not been in perfect health prior to his overexertion, for he had been progressively overtaxing himself during the spring and summer.

Another instance of a similar character occurred in a patient, J. A. F., a young man, aged twenty-four years. A year before he came under my observation he had taken a long bicycle ride, when he was not in a good physical condition, and the symptoms began immediately. He had been working in an office and was not in a good condition when he undertook a four days' ride on a tandem bicycle, the minimum daily distance being fifty miles and the maximum being seventy miles. He was prostrated at the end of the four days. His heart became very irregular, and he was confined to bed for four months. At the present time his heart extends beyond the left mammary line, and on the right to the border of the sternum. There is a suggestion of a systolic thrill and murmur at the apex, but no positive signs. The second sound at the base of the heart is not accentuated.

These instances are sufficient to show that rather unfortunate results may occur from violent excessive exercise in young persons not in proper training; and even at times in those well trained. At the same time, the charts I have presented illustrate the fact that there is a decided difference in those who are carefully and those who are insufficiently trained. With Dr. Da Costa, who discussed this question many years ago in his Toner lectures, I should be most unwilling to see danger in athletics unless the proof were positive. There is, of course, a certain amount of danger in every sport, but the danger in athletics is certainly not very great, and the necessity of careful training, not only for the combats of the athletic field but for the general struggles of life, is demonstrated by my observations.

Alluding now to the question of the auscultatory sounds over the heart, I recall the fact that in numerous instances I have discovered a systolic murmur over the body of the heart at the pulmonary area and at the apex. It is by far most common to find this at the pulmonary area, and in young boys it seems almost habitual. This murmur is usually attended by a pulsation over the pulmonary area, and on careful percussion I have found that the oblique border of the heart was somewhat convexly curved toward the left. From these facts and other considerations I have become convinced that the cause of the murmur is to be found in a dilatation of the conus arteriosus of the pulmonary artery. The murmurs at the apex may undoubtedly be due to mitral regurgitation, but I cannot convince myself that all found in this situation are of this nature. Some, I believe, are intra-ventricular; others, possibly cardio-pulmonary in origin.

With regard to the second point in the heading of my paper—viz., remote effects of athletics—I can speak only of the remote effects in the sense of the results following at intervals of a few months or years. I believe that there is also a possibility of development of symptoms many years after cardiac strain without any indications in the intervening time. We all recall the interesting publication of Dr. Morgan on the *University Oars*, being a study of the after-health of men who rowed in the University boats of Oxford and Cambridge between the years 1829 and 1869. I would also direct attention to the Toner lectures of Dr. Da Costa, delivered in 1874, in which he called attention to the possibility of strain as a result of baseball. In my own experience I have found a number of instances of distinct symptoms of cardiac disturbance in football players who had devoted themselves rather steadily to sports during their collegiate life. As cases in point, I would briefly refer to the following notes:

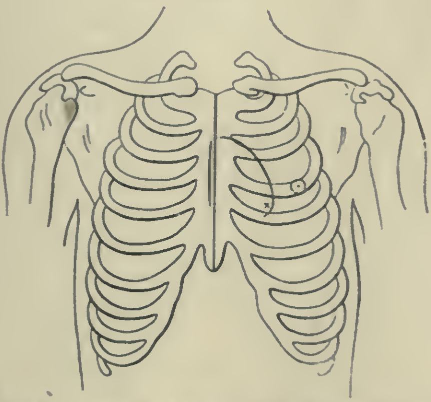
C. S., aged twenty-five years, played football steadily at his preparatory school, at college, and during his university years, and baseball less regularly during the same time. After his graduation and his entrance upon active duties, he complained of a feeling of oppression in his chest, which he described as a sensation of distention, as if the heart was too large for the body. Sometimes there was palpitation and nearly always a consciousness of the heart in some form or other. His heart extends as far as the mammary line, and to the right border of the sternum, but there is no murmur or any sign of valvular trouble. He finds that the use of tobacco and alcohol, in which he has always indulged moderately, are prone to produce unpleasant over-action of his heart.

H. W., a football player and oarsman, steadily followed athletics during his college years. He now complains, after a few years of cessation from athletics, of symptoms similar to those just described. In particular he has noted, from time to time, a tumbling sensation in the heart-beat, and he sometimes feels a sensation of oppression or dyspnœa.

C. G., a football and baseball player during six years, has complained, since his cessation from athletics, of vague oppression, fulness in the chest, and some dyspnœa. He has, however, grown distinctly stouter in the two years during which he has relinquished exercise.

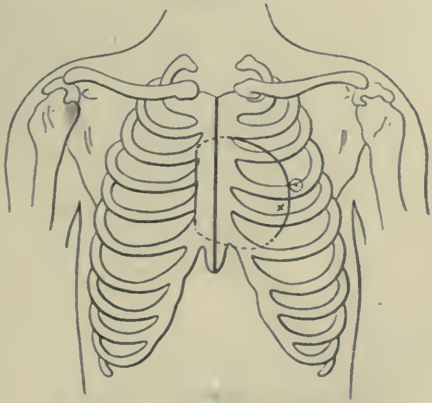
These cases will suffice to illustrate the kind of symptoms met with. I have seen many instances of this sort, and in seeking to explain their causation, have naturally been interested in the condition of the heart itself. Charts V., VI., VII., and VIII. are selected to show the increase in the size of the heart, resulting from several years' athletics. Others might be presented to illustrate the same point. It will be observed that in the two cases from which the charts were prepared the right and left ventricle increased decidedly in size during the three or four years that elapsed between the first and the second examination. In each of the men from whom these charts were taken symptoms of the sort referred to were found.

CHART V.



Football player and oarsman; outline of heart in 1894.

CHART VI.

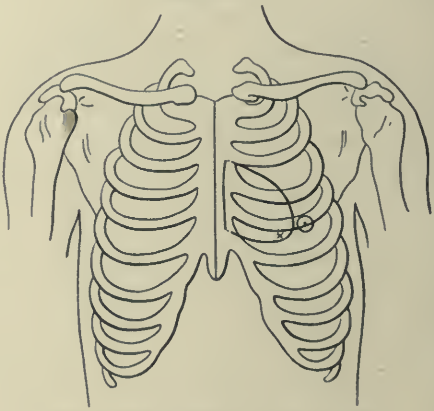


Same person; outline of heart in 1898.

Allbutt, in the article before alluded to, in mentioning the after-effects of athletics, suggests that the mean blood-pressure increases as a consequence of the withdrawal of the reducing influence of exercise.

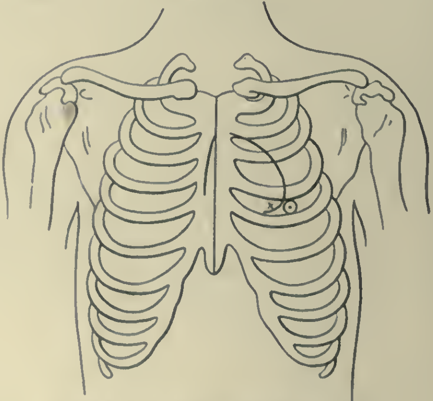
I have not been able to assure myself that the blood pressure was actually lower, as I have found the sphygmomanometer an uncertain instrument, and I cannot bring myself to trust in the evidence afforded by direct palpation of the artery. I am, however, quite ready to believe that the blood-pressure is increased on account of the evident hypertrophy, if for no other reason. In athletes who have ceased to indulge in sports, and who have for some years suffered with symptoms of oppression, there seems to be a decline of the symptoms mentioned after some years and a return to more normal conditions. I am led to make this statement from the history obtained from individuals in middle life who had been athletes during their college years. My experience has not, however, been long enough to follow such cases from the beginning,

CHART VII.



Football player; outline of heart in 1893.

CHART VIII.



Same person; outline of heart in 1896.

and I hesitate to make assumptions in cases which I had not the opportunity of examining in the beginning. On the other hand, observations which I have had the opportunity to make in men past middle life who had been very athletic in youth, have led me to believe that muscular disorders of the heart may arise after middle life as remote consequences of overexertion in early manhood. I do not speak at length of these because they are cases in which I have no means of knowing the conditions in the intervals between the beginning and the final trouble.

From the observations that I have been able to make it seems positive to me that overdistention of the heart is frequent in athletic contests, and may cause harm if the individual is in ill-health or badly trained; and, secondly, that hypertrophy and symptoms of overaction sometimes result from continued athletics. As practical conclusions, I would suggest rigid medical supervision of college athletics; and, secondly, that young men be encouraged to continue some form of exercise after discontinuance of regular athletics.

A SHORT UMBILICAL CORD AS A CAUSE OF DYSTOCIA.

WITH A DESCRIPTION OF A NEW SYMPTOM.

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An unusually short umbilical cord has long been known to possess inheritant difficulties. Early in this century the classical Denman[1] and the observant Jorg[2] not only described the dystocia due to an abnormally short cord, but gave directions for the conduct of a labor under conditions in which this rarity presented itself, and their advice has not been improved upon since their day. Obstetricians draw a distinction between the cords which are inherently short and those which are shortened by being wound about the fœtus. The former is known as a "natural" or "absolute" shortening, the latter as a "relative" or "accidental" shortening of the cord. This paper deals with the former or absolute variety.

The relative length of shortness of the umbilical cord cannot be fixed. A cord which would be of normal length, or would at least allow of easy, unassisted birth in one case, would, in another, be too short to permit a fœtus to be born without help. The cord may vary in length from two inches to many feet. To be a factor in the delay of labor the cord must actually be so short, measured from the umbilicus to its placental insertion, that the fœtus cannot be born without one of several accidents being likely to happen. These may be: rupture of the cord at any point along its course, detachment of the placenta, inversion of the uterus, or, as has not previously been clearly pointed out, an umbilical hernia in the child. The first two accidents are the more common ones, the last two the rarest, in the presence of this condition.

The location of the placenta is vital in determining the absolute length or brevity of the cord. If the placenta lies low in the uterus a cord which would prove too short were it higher in the uterine cavity is sufficiently long to permit the birth of the fœtus. A central or marginal insertion of the cord into the placenta must also be taken into account in estimating its actual length. This is, of course, not possible before birth.

In the consideration of the accidents which may ensue from an unusually short cord it is necessary to give some thought to the tensile strength of the cord and the influence of the expulsive forces upon its elasticity. Connective tissue acquires its tensile capacity from the amount of elastic fibres it contains. In the mucoid or colloid structure of the umbilical cord, elastic fibres are found increasing in number as the end of pregnancy advances. The younger the cord, the fewer and weaker are the elastic fibres—Hertwig.[12] Lesshaft,[3] quoting the figures of Valentin and Rauber, states that the tensile strength of connective tissue containing elastic fibrils is greater than that of a wire made of lead and equal to that of a cord of tow. The elasticity of the umbilical cord has also been made the subject of study by Duncan[4] and Lamare.[5] The former observers found that the average cord breaks under a strain of eight and one-quarter pounds, while Lamare's figures are somewhat lower than this. He found that the cord ruptures under the influence of a falling weight at about five and one half pounds. It seems to me that the statements of Duncan and Turnbull are entitled to greater consideration, since their experiments were conducted on principles more nearly consistent with the actual conditions.

Assuming, then, that the average cord will break under a strain ot between eight and nine pounds, and that the force of the uterine contractions during expulsive pains is forty pounds, as given by Herman,[6] it is evident that the cord must be long enough during birth to allow the umbilicus to reach the vulva and slightly beyond it, or it will break, or will tear the cord from its umbilical insertion, or will tear the placenta from its insertion, producing hemorrhage, death of the fœtus, or an inversion. Negrier[7] gives the average length of the parturient canal at the time of the expulsion of the fœtus as 8¾ inches, and I am not acquainted with any figures which are more reliable. The limit of safety, then, in the length of the cord would be about ten inches—that is, a cord shorter than this would be almost certain to be productive of accident. Kaltenbach[8] points out that the placental insertion of the cord has much to do with the dangers of its shortness, as we have already seen. He believes, however, that if the placental insertion of the cord is at the fundus, 35 centimetres (13 inches) is too short for a safe delivery, while in the lower insertion, he thinks 20 centimetres (8 inches) long enough for easy birth. So far as I can learn, Kaltenbach stands alone in his belief that even under favorable conditions a cord of 8 inches is a safe one. On physical grounds we have seen that the cord should be at least 10 inches long to ensure an unassisted delivery.

Cords shorter than 10 inches are very rare. In two services which embraced upward of 1200 cases I never saw one. Dewees[9] had never seen an absolutely short cord, and was inclined to doubt the existence of such an anomaly. Many ruptures of the cord, some cases of inversion of the uterus, some accidental hemorrhages from the placenta, so-called, and some of the umbilical hernias in children, as I shall show, can be traced to this phenomenon.

Before referring to the diagnosis and treatment of an absolutely short cord I shall record a case which came under my observation, in many respects a classical one:

Elderly primipara; position, L. O. A.; protracted first and second stages; short cord; separation of the placenta during labor; post-partum melancholia; umbilical hernia in child. Mrs. E. G. B., aged thirty-four years, married eight years, primigravida. Menstruation has always been regular but painful. There is no family or personal history of importance. There is no history of syphilis. The last menses appeared February 22, 1895. The predicted date of confinement was November 29, 1895. The pregnancy was uneventful. The urine was negative throughout. The feet and hands were somewhat swollen toward the end of the gestation, but there was no general œdema. The patient had read some popular work on marriage, and was very apprehensive as to the outcome of her labor. During her confinement she talked in an absurdly mistaken manner of child-bed fever, second-stage pains, child's stomach-rash, etc. The patient was a stout woman, but not inordinately so; she was phlegmatic, stupid, and exceedingly irritable. The pelvic measurements showed a pelvis somewhat larger than usual.

On December 3, 1895, she had a few false pains, with the discharge of some fluid, which I had no opportunity of seeing. At 8 P.M., December 6th, labor began with infrequent and weak pains, and the patient remained in this condition until 1 P.M. of December 7th, when she complained greatly of fatigue, and begged to have the child taken from her. She was given a hypodermatic of one-quarter of a grain of morphine, after which she slept for two and one-half hours. At 5.40 P.M., labor pains again started in, weak and infrequent. The fœtal heart was then beating at the rate of 140. At 10 P.M. the patient was given fifteen grains of the muriate of quinine. In half an hour the pains had become much stronger and more frequent. The cervix had almost disappeared, and at 11.30 P.M. the membranes were artificially ruptured, in the hope of hastening delivery. It was, however, 2 A.M., December 8th, before the patient was fully in the second stage. The pains were now frequent and expulsive, and again and again the head could be seen at the vulva, only to be retracted as soon as the uterine contraction ceased. In the intervals between pains, as well as during a pain, bright arterial blood constantly escaped, but not in sufficient quantity to cause alarm or to weaken the patient. During the entire second stage the patient complained of pain over the left side of the uterus, at a point where I subsequently located the placenta. She urinated frequently during the beginning of the second stage, *between pains*, passing a small quantity of urine at a time. At 5.30 A.M. a male child, weighing six and three-quarter pounds, was born, the head being peeled out of the labia, and firmly held, despite the efforts of retraction, which ceased when the biparietals were in the vulva. The child was somewhat asphyxiated, having passed meconium for twenty minutes previous to its birth and being covered with it. It was easily resuscitated, the cord being tied at once. At no time did the necessity of applying forceps seem necessary to me.

The hand placed over the fundus immediately after the birth of the child could easily feel the placenta at its insertion on the left side of the uterus about midway between the fundus and the cervix. It was expelled with such ease twenty minutes later that I was convinced at the time that it had been lying loose in the uterus, an opinion which was confirmed by finding its maternal surface covered with a large and moderately thick clot. This condition also made clear the source of the hemorrhage of arterial character during labor. The cervix, I might add, had not been torn. The placenta was the seat of marked calcareous degeneration The cord measured, in its entirety, ten and one-half inches.

Convalescence was interrupted by a mild melancholia, which disappeared in two weeks. The child was noticed the following morning to have a marked protrusion at the umbilicus, which, after the dropping off of the cord, presented a granulating surface. A month later it looked like a small collar-button. Under the application of the solid silver stick and a compressing bandage it disappeared in four months. This protrusion was at first thought to be a Meckel's diverticulum, but a careful subsequent examination proved it to be an umbilical hernia. I believe that it was the direct result of the tremendous tension exerted upon the cord and its attachments at both ends during labor.

The delay in both the first and second stages can be credited without harshness, I believe, to the extreme brevity of the cord. The fact that the patient was an elderly primipara, who was somewhat stout, may have been an element of delay in the first stage, but it would be going far afield to attribute all the symptoms—the pain over the placental site, the arterial bleeding during labor, the recession of the head between pains, the frequent urination between pains, the umbilical hernia of the child—to anything but the fact that the cord was abnormally short, so short, in fact, that the child could just be born without artificial assistance.

SYMPTOMS AND DIAGNOSIS. The symptomatology which characterizes the absolute or natural short cord does not differ much from that which is seen when the cord is shortened by being coiled about the child's body. The variations which may present themselves in a perfectly normal confinement may easily obscure the symptoms of a condition at no time common. Probably the most characteristic phenomenon to be attributed to the short cord is[1] the recession of the head with the dying out and disappearance with each successive pain. This is so marked, and so much greater than the recession which follows the usual cessation of uterine contraction during labor, that it attracts the attention of the accoucheur at once. The entire parturient canal diminishes in length with the advent of uterine pains, increasing again as the uterus relaxes, so that in an uncomplicated case the head naturally recedes after a certain advance. When, however, in addition to the natural recession there is added the elastic pull of an umbilical cord which will not permit the fœtus to maintain the advance it has made, it is evident that not only will the head recede with the end of each pain, but that this recession will be so rapid and so constant that it will offer a striking feature in the delay of labor. In the case narrated this recession was a puzzling factor to me, for I confess that its cause was not clear to me before the child was born.

Those who have written on the subject give a prominent place in the symptomatology to[2] pain over the placental site and depression of the placental area during a pain or during traction by the forceps, attributing the pain to peritoneal stretching. (Duncan.[4]) The former of these elements was decidedly in the foreground in my case. The latter was not observed. It is natural to expect pain in this condition when the placenta is undergoing a pull or a tug with each succeeding contraction of the uterus, for, though the entire genital canal diminishes in length with each pain, the child advancing despite the shortness of the cord, the tendency is for the placenta to become freed from its attachment to the uterine wall. Actual detachment occurs when the cord is exceedingly short in all those instances in which the umbilical insertion does not give way. In my case the placenta undoubtedly suffered partial separation, a deduction easily made from the constant appearance of bright blood during the labor, and from the condition of the placenta after its delivery. The fact that the recession of the head ceased upon the birth of the biparietals in my case was also unquestionably to be attributed to the loosening of the placenta and the consequent absence of further resistance.

Bleeding during labor, which does not come from a placenta prævia, or a torn cervix, or a tear in the vagina, should always direct suspicion toward the placenta, and when there is a combination of symptoms such as are included in this description the cause may not unfruitfully be sought in a shortened cord. In the case presented the hemorrhage was of an arterial character throughout, and aroused curiosity as to its probable source. It was present as well in the absence of pains as when the uterus was contracting. At no time did it impair the volume of the pulse of the patient, who was rather a plethoric woman.

It might well be expected in a condition in which there is a constant opposing influence on the accession of each pain to the advance of the fœtus that an exhaustion of the pains would ensue as a consequence. In my case this did not occur during the second stage, in which the dystocia was most marked. The delay in the first stage I have been inclined to attribute in part to the fact that I had an elderly and rather stout primipara to deal with. Napier,[10] however, regards uterine inertia as a cardinal symptom of a shortened cord or of one absolutely short. The expulsive pains of the second stage in the case here reported gave no indication of abnormality alone—they were strong and frequent Another symptom which was lacking in my patient was one upon which much emphasis is laid by King,[11] who has reported a number of these cases. He assumes that it is indicative of the patient's natural desire to obtain the benefits of gravity in delivering herself of her child, a view in which he was anticipated by Denman.[1] It certainly seems most natural for a patient with this anomaly to assume the upright position, and, as a matter of fact, my patient was frequently in the semi erect position during the second stage, but made no mention of the fact that that posture gave her any relief.

A symptom which I wish to add to the symptom-complex of a natural short cord—which might be equally applicable to a cord wound about the child's body, and which I have been unable to find elsewhere recorded—is one that was quite striking in my case—the frequent urination during the first part of the second stage. A moment's consideration of the anatomy of the soft parts at this stage of labor will aid, I think, in giving a clear notion of the significance of this symptom.

The bladder lies entirely above the pubes when the second stage has become established. As this stage proceeds to its natural termination by the advance of the fœtal head the bladder becomes tightly pressed against the symphysis, lying parallel with it. The urethra, too, is compressed and becomes elongated. It is notorious how difficult catheterization becomes at this stage of labor, and how almost impossible it is for a woman to urinate spontaneously at this time. Urination, then, on the disappearance of each pain, when the cervix had entirely disappeared, was a striking phenomenon, and is to be accounted for only on the ground that as the expulsive effect of a uterine contraction wore off the short cord was sufficiently strong to draw back the body, and with it, of course, the head. This manœuvre allowed the bladder again to fall forward and to empty itself of its contents, being stimulated to the act by its frequent compression. As soon as the head had advanced to a point from which the retractive efforts of the short cord could no longer dislodge it the urination ceased.

It is a perfectly logical deduction, I think, that when we have the unusual symptom of urination during the intervals of pain in the second stage, especially at its beginning, that the attention of the accoucheur should be directed toward the shortness of the cord as the probable cause of this unusual clinical feature. He should be especially suspicious of this condition if there are a simultaneous recession of the head in the intervals, arterial bleeding almost constantly, and one or more of the other symptoms already recorded.

Briefly to summarize the diagnostic points in the order or their importance, I would place them as follows:

1. Recession of the head in the intervals of pains.
2. Arterial bleeding during and between uterine contractions.
3. Urination in small quantities in the intervals of pain after the establishment of the second stage.
4. Pain over the placental site, especially during a uterine contraction or during the application of forceps.
5. A desire of the patient to sit up.
6. Uterine inertia.

TREATMENT.—It is unfortunate that a diagnosis of an absolutely short cord can rarely be made with certainty before the birth of the child as far as the umbilicus. If it were possible always to make sure of the condition treatment would be of little avail. When a short cord is suspected, and the life of the child is thought to be in danger from the objective signs of an accelerated heart or the passage of meconium, the labor should be terminated as soon as possible. By pressing the fœtus down the placental insertion of the cord is brought near its umbilical insertion, and the danger of rupture somewhat obviated. But this is not always feasible or possible. Postural methods may be tried by having the mother assume a squatting or kneeling position, as recommended by Denman[1] and praised by King.[11] If the child presents by the breech, the cord should be tied as soon as the umbilicus is born. The advice given in some text-books, regardless of the position, to tie the cord if it is found too short to allow the birth to take place, is little short of absurd. The impossibility of tying the cord of a child in the second stage of being born is so self-evident that it seems almost laughable to refer to it were it not that some authors recommend it in perfect good faith. The use of the forceps is practically contraindicated in these cases: it would be almost certain to end disastrously to the child.

109 WEST EIGHTY-SECOND STREET.

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AN EXPERIMENTAL STUDY OF THE ABSORPTION OF STRYCHNINE IN THE DIFFERENT SECTIONS OF THE ALIMENTARY CANAL OF DOGS.*

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The experimental study of the absorption of strychnine from the alimentary canal which I began some years ago on rabbits[1] I have continued on dogs, because it is an indispensable requirement that results which were obtained from experiments upon one class of animals should be tested in experiments on another class of animals before we think of applying such results to the human being, who is the centre of our interest.

Strychnine is available for the study of absorption chiefly on account of its characteristic reaction upon the animal—the appearance of a tetanus is a sure proof of the absorption of a sufficient quantity. The effective doses and the times which elapse between the administration of the poison and the appearance of the tetanus can serve as units for the comparison of the powers of absorption in the different parts of the alimentary canal in the same class of animals.

In such comparisons, of course, the weight of the animal has to be taken into consideration, inasmuch as it might happen that a large dose will not have any effect in a large animal, while a smaller dose may cause a tetanus in a smaller animal. In the experiments which I am now going to present the effective doses of strychnine were reduced to the unit weight of the animal—*i. e.*, in each case the number of milligrammes of strychnine which proved to be effective were divided by the number of kilogrammes of the weight of the animal, thus establishing the number of milligrammes required for each kilogramme of dog to bring out a pronounced tetanus.

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* Read at the annual meeting of the American Gastro-Enterological Association, Washington, D. C., May 2, 1899.

In each experiment the animal was under ether anæsthesia throughout the entire operation.

The sections of the alimentary canal which were thus separately tested for their absorbent power are as follows: Pharynx, œsophagus, stomach, small intestines, large intestine, and rectum.

The report on these separate sections we shall preface, however, with a few experiments in which the strychnine was introduced into the non-isolated stomach of normal animals, where it is, therefore, uncertain in what section of the canal the absorption in these experiments really takes place.

We are now going to let the experiments speak for themselves.

SERIES A.—*Strychnine in the normal stomach.*

EXPERIMENT 1.—A dog, weighing 22 kg., after having fasted for thirty hours, was slightly narcotized, and 22 mg. of strychnine in 50 c.c. of normal salt solution, colored with indigo-carmine, were introduced through a tube into the stomach. The tube was employed, to avoid the contact of strychnine with the mouth, pharynx, etc., and the liquid was stained, in order to recognize its escape. The animal taken from the table had the first tetanic fit just one hour after the administration of the strychnine; a few more fits followed, but the dog survived. In this experiment 1 mg. of strychnine to 1 kg. of dog brought out a tetanus sixty minutes after administration.

EXPERIMENT 2*a*.—A large dog of 35 kg. was given ether; as in the previous experiment, 20 mg. of strychnine were introduced into the stomach. During observation for three hours there was no effect. Here four-sevenths of a milligramme to the kilogramme of dog had no effect.

EXPERIMENT 2*b*.—The same dog, seven days later. I introduced into the stomach, under the same conditions as before, 30 mg of strychnine. Tetanus appeared after forty minutes, and death occurred forty minutes later. In this case six-sevenths of a milligramme to the kilogramme brought tetanus after forty minutes.

Some more experiments of the same kind were made, but they will not be reported in detail. All these experiments can be reduced to the following average figures: One and one-sixth of a milligramme of strychnine to one kilogramme of dog brings out a tetanus thirty minutes after the introduction of the poison through a tube into the non-isolated stomach of a normal animal. We might remark here that the usual administration of the poison by the mouth is complicated by the fact that it has to come into contact with the mouth, pharynx, etc., where, as it will be shown later, strychnine is absorbed quite readily.

In presenting the experiments on absorption in the separate sections of the alimentary canal we will commence with the small intestines, where, in normal conditions, probably the main absorption takes place. By so doing we shall obtain at the same time a unit by which to measure the absorbent power in the other sections.

As far as I am aware no such experiments were yet made by other investigators to determine the absorption of strychnine from the intestines when introduced into them directly.

SERIES B.—*Strychnine introduced into an isolated loop of the small intestines.*

EXPERIMENT 1.—A dog of 13 kg. was given ether, the intestines exposed and tied at a distance of 12 cm. from the pylorus; an opening was made into the stomach and a tube introduced through the pylorus into the intestine; through this tube 40 mg. of strychnine in 10 c.c. normal salt solution stained with methylene-blue were injected; the tube was then withdrawn and the pylorus rapidly tied. Seven minutes after injection, before the sewing-up of the abdomen could be finished, a tetanus broke out, and the animal died eight minutes later.

In this experiment 3 mg. of strychnine to 1 kg. of dog brought out a tetanus after seven minutes.

EXPERIMENT 2.—A dog of 12½ kg. was given ether, the abdomen opened, a loop of the ileum 12 cm. in length tied at both ends, and 15 mg. of strychnine were injected by a hypodermatic syringe into the empty lumen of the intestinal loop. Tetanus broke out in eleven minutes, and the dog died in twenty-one minutes after the injection. Here 1⅕ mg. of strychnine to 1 kg. of dog brought out a tetanus eleven minutes after the injection.

Here, too, I shall restrict myself to the detailed report of only two illustrative experiments. The average figures are: 1⅖ mg. of strychnine to 1 kg. of dog introduced into a loop of 12 cm. length of the small intestine will bring out a tetanus in ten minutes.

It is probable that in a longer loop the same effect could be obtained by even a smaller dose. I have, however, restricted my experiments invariably to a loop of the same length.

We turn now to that section of the alimentary canal the absorbent power of which has of late often been the subject of investigation—I mean the stomach. We shall restrict the brief historical remarks to the studies made with strychnine. Here we find that Bouley and Colin[2] maintain that it was absorbed quite rapidly in the stomachs of dogs, cats, etc., when the pylorus was tied. Tappeiner[3] finds that in cats the absorbent power of strychnine was retarded in the stomach when the pylorus was tied. In the investigations of these writers the cardia remained open and the animals often vomited. In my experience on rabbits,[4] whose stomachs were ligated at the cardia and the pylorus, no strychnine was ever absorbed from this organ.

In my present experiments on dogs I have studied the absorption from the entire stomach as well as from the fundus alone.

SERIES C.—*Absorption from the isolated stomach.*

EXPERIMENT 1.—A dog weighing 7300 gr. was given ether, the stomach was exposed and the cardia ligated. An opening was made into the duodenum, and through it 20 mg. of strychnine in normal saline solution, colored with methylene-blue, was injected into the stomach by means of a syringe with a long blunt nozzle; the syringe was withdrawn and the pylorus ligated. For two hours and fifteen minutes the dog was observed, but no tetanus appeared, and not even a sign of hyperæsthesia. The dog vomited often, but only white foam without a tinge of blue, a proof that the ligature of the cardia was tight. To prove that the channels of absorption from the stomach were not cut off by the ligatures around the cardia and pylorus, 8 mg. of strychnine in solution tinged with blue were now injected by means of a hypodermatic syringe into the submucous tissue of the anterior wall of the stomach; six minutes later the animal died in a violent tetanic fit while still under ether.

In this experiment 2⅔ mg. of strychnine to 1 kg. of dog had no effect upon the animal.

EXPERIMENT 2.—A dog weighing 10 kg. was etherized; the strychnine was introduced through a tube into a normal stomach. The animal had a tetanus after twenty-five minutes, followed by many other fits, but it survived; 1½ mg. of strychnine to 1 kg. of dog introduced into a normal stomach caused tetanus after twenty-five minutes.

The same dog, five days later, was given ether, the stomach was exposed, the cardia ligated, and we injected through the duodenum into the stomach 30 mg. of strychnine in 50 c.cm. colored saline solution, the pylorus being ligated. It was observed for two hours, but no tetanus, and even no hyperæsthesia appeared. Observation had to be discontinued, and the animal was killed with chloroform.

In this experiment it was conclusively demonstrated that while in the normal stomach of the dog 1½ mg. of strychnine to 1 kg. of dog brought out a tetanus twenty-five minutes after administration of the poison into the stomach, but after ligation of the cardia and pylorus 3 mg. to 1 kg. of dog had no effect whatever. This demonstrates distinctly the pronounced retardation of the absorption in the stomach, comparing it with the absorption in the intestines, where 3 mg. of strychnine to 1 kg. of dog would surely bring out a tetanus in seven or eight minutes.

However, the stomach of the dog differs from that of the rabbit, inasmuch as in the dog large doses of strychnine would bring out a tetanus from the stomach with tied orifices, as can be seen from the following experiments:

Experiment 3.—Ether was given to a dog weighing 6 kg., the cardia was tied, and I introduced into the stomach through a tube in the pylorus 150 mg. of strychnine in 20 c.c. alcohol (25 per cent.); the pylorus was ligated, the wound sewed up, and the ether discontinued; forty-five minutes later a distinct tetanus broke out, and the animal died after two hours; 25 mg. of strychnine (in alcohol) to 1 kg. of dog brought out a tetanus after forty-five minutes.

I have made a large number of experiments on the absorption from the isolated stomach under varying conditions; either the cardia was first tied and the strychnine was introduced through the pylorus, which was then tied later, or the pylorus was tied first and the strychnine was introduced into the stomach by a tube through the mouth or through an opening in the œsophagus, and then I ligated either the cardia or the œsophagus below the wound. The average figure of all these experiments amount to this: 20 mg. of strychnine to 1 kg. of dog brings out a tetanus forty-two minutes after the introduction of the poison. The smallest dose which was effective in one of these experiments amounted to 9 mg. of strychnine in alcohol to 1 kg. of dog.

The introduction of strychnine into a stomach, the pylorus of which was ligated, but the cardia left open, has not given me clear results, as it was usually complicated by vomiting, which means the bringing of the strychnine into the pharynx, mouth, etc.

I have attempted to study the absorbent power of the fundus of the stomach separately, and the results which I have obtained indicate that the absorptive power is distinctly smaller than that of the entire stomach. This can be seen from the following experiment:

Experiment 4.—A dog weighing 5 kg. was etherized, the stomach ligated between the fundus and pyloric portion, cardia ligated, a stomach canula tied tightly in the fundus, and through it 100 mg. of strychnine in an alcohol solution introduced into the fundus. The animal was observed for eighty minutes, but no effect, not even hyperæsthesia, was seen. To prove that the paths of absorption were not cut off by the ligatures, 6 mg. of strychnine were injected into the submucous tissue of the wall of the fundus, and six minutes later a violent tetanus appeared. In this experiment even 20 mg. to 1 kg. of dog could bring out no effect.

We should remark here that the absorption which we have seen readily occurs when the drug is introduced into the non-isolated stomach of normal animals, probably takes place in the intestines; and a part of the interval between the administration of the poison and the appearance of the tetanus seems to be consumed by the time required for the poison to pass in sufficient quantity from the stomach into the intestines.

This accounts for the difference in the length of the intervals of the absorption from the normal stomach and from the intestines.

The opinions which we meet with in the older literature on the absorbent power of the œsophagus are simply guesswork and mostly incorrect. The writer of the chapter on absorption, in the *Classical Handbook of Physiology*, by Hermann,[5] proclaims that "while the food is slowly passing through the œsophagus undoubtedly some of it becomes absorbed there." Berg,[6] who described the well-known case of immense dilatation of the œsophagus observed by Luschka,[7] goes so far as to state that the patient's life was supported by absorption of food from the œsophagus. In the case of chronic cardiospasm, with consecutive dilatation of the œsophagus, which I described some years ago,[8] I demonstrated that atropine or alcohol was never absorbed from the œsophagus. In a similar case recently described by Maybaum,[9] it was established that iodide of potash remained unabsorbed in the œsophagus. In the experiments on rabbits I have shown[10] that the œsophagus of these animals absorbs strychnine very poorly. Similar results were obtained in my present experiments on dogs.

SERIES D.—*Absorption of strychnine from the œsophagus.*

EXPERIMENT 1.—A dog of 7 kg. was etherized, the cardia tied, and I injected into the œsophagus 19 mg. of strychnine. The œsophagus was tied above. After one hundred and forty minutes' observation there was no effect, but the animal was found dead the next morning, aspiration pneumonia being the apparent cause of death; $2\frac{5}{7}$ mg. of strychnine to 1 kg. of dog had no effect.

EXPERIMENT 2.—A dog weighing 4 kg., etherized, was similarly treated. I injected into the œsophagus 20 mg. of strychnine, and tied the œsophagus above. After forty-five minutes a weak tetanus appeared. The dog died after two hours. Here 5 mg. of strychnine to 1 kg. of dog brought out a moderate tetanus after forty-five minutes.

The average figures from all the experiments are: $4\frac{1}{2}$ mg. of strychnine to 1 kg. of dog brought out a tetanus after forty-seven minutes.

We should remember that in these experiments the animal, after awakening from the ether, is swallowing very frequently, and that the peristalsis which follows each deglutition passes under the ligature to the lower parts.[11] The strychnine in the œsophagus is therefore very often subjected to a high pressure, which, of course, facilitates the absorption.

Experiments upon absorption within the pharynx cannot be conducted with desirable precision, since this part cannot be well separated from the mouth, nose, and larynx. The data which were derived from our experiments must indeed be interpreted as an expression of the absorption which takes place in all these parts together, though the bulk of the liquid injected into the pharynx remains there, especially if the animal is kept throughout the experiment on its back, with the head well fixed. Moreover, each experiment was followed up by an autopsy, for the purpose of ascertaining the parts in which the stained solution of strychnine was really located.

SERIES E.—*Strychnine injected into the pharynx.*

EXPERIMENT 1.—A dog weighing 4 kg. was etherized, tracheotomy was performed, and the trachea ligated above; the œsophagus was tied just below the pharynx. I introduced into the pharynx 12 mg. of strychnine in 5 c.c. of a stained solution. Tetanus followed after twenty-five minutes, and death one hour later. Autopsy showed blue saliva mainly in the pharynx, but also in the mouth and in the larynx. In this experiment 3 mg. of strychnine to 1 kg. of dog brought out a tetanus within twenty-five minutes. This can also be taken as an average figure from all the experiments in which tracheotomy was performed. In experiments without tracheotomy the tetanus appeared much earlier after injection and with smaller doses. The autopsies have shown, however, that the blue stain extended deep into the trachea. This observation gave rise to the following experiment:

A dog of 11½ kg. was etherized, and I injected directly into the trachea 15 mg. of strychnine. Tetanus occurred after six minutes. There were fits, with very short intermissions, until death set in ten minutes later. Here 1½ mg. of strychnine to 1 kg. of dog brought out strong tetanic attacks in six minutes.

The absorbent power of the large intestine does not seem to differ materially from that of the small intestines, but the presence of some fecal masses within the colon seems to retard the absorption somewhat, as can be seen in the following experiments:

SERIES F.—*Absorption in the colon.*

EXPERIMENT 1.—To a dog weighing 12½ kg. ether was administered, and the colon, which was not entirely empty, was tied near its junction with the small intestine. An opening was made in the lower part, and 20 mg. of strychnine in a 6 c.c. saline solution injected into the upper part, and the bowel tied immediately. The length of the isolated gut was about 12 cm. The first tetanic fit occurred after twenty-three minutes, the animal dying one hour later. In this experiment 1⅗ mg. of strychnine to 1 kg. of dog produced a tetanus in twenty-three minutes.

EXPERIMENT 2.—A dog of 7½ kg. was given ether and the colon exposed. It was empty. A piece 12 cm. in length was isolated by ligatures, and 10 mg. of strychnine was injected into the lumen of this piece by means of a hypodermatic syringe, and the puncture clamped. The first tetanus appeared nine minutes after the injection, and the animal died after twenty-three minutes. Here $1\frac{1}{8}$ mg. of strychnine to 1 kg. of dog brought out a tetanus after nine minutes.

There have been, however, some variations with regard to doses and time of absorption even in experiments with a perfectly empty colon.

The average figures of these experiments are: $1\frac{4}{5}$ mg. of strychnine to 1 kg. of dog brings out a tetanus in fourteen minutes.

In the experiments upon the rectum we have studied the effect of the injection of strychnine in a non-isolated normal rectum as well as in a rectum which was separated from a colon by means of a ligature. In the first case we are not studying the absorption in the rectum alone, as a part of the injected liquid is surely carried up into the colon or perhaps even into the small intestines.

It deserves to be mentioned especially that in the experiments on the rectum this organ was rarely empty.

On account of the practical importance of these experiments we will describe here in detail a greater number of them.

SERIES G.—*Experiments upon the rectum.*

(*a*) Normal rectum.

EXPERIMENT 1.—Dog of 17 kg.; I injected into the normal rectum 18 mg. of strychnine; after fifteen minutes a tetanic attack broke out; a few more fits followed, but the animal survived. In this experiment $1\frac{1}{17}$ mg. of strychnine to 1 kg. of dog brought out a tetanus after fifteen minutes.

EXPERIMENT 2.—Dog of 22 kg.; I injected 22 mg. of strychnine into the normal rectum. Tetanus occurred after fifteen minutes, and the animal died after an hour. Here again 1 mg. of strychnine to 1 kg. of dog brings out a tetanus after fifteen minutes.

EXPERIMENT 3.—A dog of 23 kg., which received 300 mg. of strychnine in the isolated stomach, was observed for over two hours, but no effect appeared. Now 50 mg. of strychnine was injected through the anus into the rectum; after nine minutes a violent tetanus appeared, and the animal died ten minutes later.

(*b*) Rectum tied about 15 cm. above the anus.

EXPERIMENT 4.—A dog of $11\frac{1}{2}$ kg. was etherized, the rectum tied, and I injected through the anus 20 mg. of strychnine in 6 c.c. of water, colored with methylene-blue; at least one-half of the liquid came out again. Tetanus appeared after fifteen minutes, and death after half an hour. Here about $\frac{4}{5}$ mg. of strychnine to 1 kg. of dog brought a tetanus in fifteen minutes.

EXPERIMENT 5.—Dog of $8\frac{1}{2}$ kg.; after etherization the rectum was tied, and I injected 10 mg. of strychnine into the lumen through the wall of the gut by means of a hypodermatic syringe; the puncture was clamped. After eight minutes a strong tetanus appeared; the animal died after twenty-five minutes. In this experiment 1½ mg. of strychnine brought out a tetanic fit in eight minutes.

Experiment 6.—A dog of 7 kg. was similarly injected with 20 mg. of strychnine, and the puncture clamped. A violent tetanus broke out after four minutes, and the animal died six minutes later. Here 2⅘ mg. of strychnine brought out a tetanus in four minutes.

Experiment 7.—A dog of 5700 gr. was etherized, the rectum tied, and I injected through the anus 20 mg. of strychnine in 6 c.c. of colored water; a few drops were expelled. A violent tetanus occurred in two minutes, and death one minute later. In this experiment 3½ mg. of strychnine to 1 kg. of dog gave a tetanus in two minutes.

The average figures from these and other experiments upon the isolated rectum are: 1⅘ mg. of strychnine to 1 kg. of dog brings a tetanus in seven minutes.

In the following three tables a condensed presentation is to be found of the results of the experiments upon the different sections of the alimentary canal. The first table gives that experiment upon each section in which the minimum effectual dose was used. The second table gives the experiment with the shortest interval. The third table gives *average figures* for each series of experiments, which were obtained by the following simple method: The amount in milligrammes of strychnine to the kilogramme of dog, which were employed in every experiment, were added together, and the sum total was divided by the number of experiments made in this series. The same was done with the intervals between the injection and the appearance of the tetanus. All the intervals, in minutes, were added together, and the sum-total was divided by the number of experiments in this series. Both numbers, which were thus composed from all the experiments in each series, were linked together to an average figure which might present at least in an approximate way the absorbent power for strychnine of the corresponding section.

It should be remembered that in starting out to study the absorbent power by means of the characteristic effect of strychnine we had two criteria in mind, by means of which the degree of absorption could be estimated. One of these was the dose which brings out a tetanus, and the other was the time which passes between the administration of the poison and the appearance of the tetanus. Both criteria, the dose and the time, have in common that they are in inverse proportion to the power of absorption—*i. e.*, absorption is increased when they are decreased—in other words, the smaller the dose which can bring on a tetanus, and the shorter the interval between the administration of strychnine and the outbreak of the fit, the greater is the power of absorption of the part in which the strychnine was introduced. But both criteria are in inverse proportion to each other, and cannot be observed during one and the same experiment. The smaller the dose which can effect a tetanus the longer is the interval between the appearance of the tetanus and the administration of strychnine, and, on the other hand, in order to obtain a shorter interval a larger dose has to be employed. However, by compounding average figures from the entire series of experiments with the minimum dose, as well as those with the shorter intervals, we obtain a measure for the absorbent power in which both criteria are equally represented. We can now state that the first table presents the power of absorption as adjudged by the criterion of the dose, the second table that judged by the criterion of the interval, and the third table shows the absorbent power as compounded from both criteria together.

TABLE I.—SHOWS THE EXPERIMENTS WITH THE EFFECTIVE MINIMUM DOSES OF STRYCHNINE IN MILLIGRAMMES REDUCED TO 1 KILO OF DOG.

Section of alimentary canal.	*Strychnine.*	*Interval between injection and tetanus.*
Normal stomach	$\frac{6}{7}$ mgr.	40 minutes.
Small intestines	1 "	13 "
Isolated stomach	9 "	20 "
Œsophagus	4 "	50 "
Pharynx	$1\frac{2}{3}$ "	20 "
Colon	$1\frac{1}{3}$ "	9 "
Rectum	$\frac{4}{5}$ "	15 "

TABLE II.—SHOWS THE EXPERIMENTS WITH SHORTEST INTERVAL BETWEEN INJECTIONS AND APPEARANCE OF TETANUS.

Section of alimentary canal.	*Strychnine.*	*Interval between injection and tetanus.*
Normal stomach	$1\frac{1}{2}$ mgr.	25 minutes.
Small intestines	$2\frac{1}{2}$ "	8 "
Isolated stomach	23 "	15 "
Œsophagus	5 "	45 "
Pharynx	$1\frac{2}{3}$ "	20 "
Colon	$1\frac{2}{7}$ "	8 "
Rectum	$3\frac{1}{2}$ "	2 "

TABLE III.—AVERAGE FIGURES.

Section of alimentary canal.	*Strychnine.*	*Interval between injection and tetanus.*
Normal stomach	$1\frac{1}{6}$ mgr.	31 minutes.
Small intestines	$1\frac{2}{5}$ "	10 "
Isolated stomach	20 "	42 "
Œsophagus	$4\frac{1}{2}$ "	47 "
Pharynx	3 "	25 "
Colon	$1\frac{4}{5}$ "	14 "
Rectum	$1\frac{4}{5}$ "	7 "

I believe that the experiments embodied in this paper have established the following points:

The absorption of strychnine in the stomach is incomparably lower than in any other section of the alimentary canal, and, furthermore, the absorbent power of the fundus seems to be even lower than that of the entire stomach.

The power of absorption in the œsophagus is somewhat better than in the stomach, but is still considerably inferior to the absorption within the other parts of the alimentary canal.

The power of absorption in the other three parts of the canal—*i. e.*, the small intestines, colon, and rectum—seems to be equal. The differences which were observed are too small and the method not exact enough to justify the assumption of an actual difference in the absorbing power of these parts. However, these experiments brought out the following remarkable facts: that the isolated rectum absorbs at least as well as the small intestines; that in some experiments the effects appeared earlier when the rectum was isolated than when it had free connection with the balance of the gut; that from no part of the canal were such short intervals between the injection of the strychnine and the appearance of the tetanus observed as were frequently seen when it was injected into the rectum—in the latter case the interval was sometimes only two or three minutes; finally, impaction of the rectum proved to be no hinderance to the prompt absorption of the poison therefrom.

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A CRITICAL SUMMARY OF THE LITERATURE

ON

SPLENIC PSEUDOLEUKÆMIA (ANÆMIA SPLENICA; SPLENOMEGALIE PRIMITIVE).[1]

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HISTORY OF THE DISEASE. The history of splenic pseudoleukæmia is inseparably connected with that of the diseases to which it is closely allied—namely, leukæmia and the other forms of pseudoleukæmia. Its study, therefore, may well trace the development of our knowledge of those diseases as a class. The attention of the medical profession was early directed to a complexus of symptoms characterized by enlargement of the spleen, pallor, hemorrhages, œdema, and grave cachexia. Hippocrates wrote on the association of splenic tumor with dysentery, hemorrhage, scorbutus, and miasmatic diseases. Galen described hypertrophy of the spleen in protracted autumnal fever and other cachectic states. Malpighi, Morgagni and others observed splenic and lymphatic enlargement associated with pallor, hemorrhage, and emaciation, which progressed to a fatal termination. Nivet[1] mentions scorbutus, rhachitis, and scrofula among the many causes of splenic enlargement. In some of the cases of splenic hypertrophy reported by him under the heading of rhachitis and scrofula, extensive glandular enlargement and grave cachexia developed during the course of the disorders. There is much in the literature of the older writers to indicate that they were quite familiar with hypertrophy of the spleen in miasmatic disease, and that they also had noted the condition in various other affections, such as scrofula, continued fevers, syphilis, and liver disease. Now and then one also finds record of cases in which, without apparent cause, the spleen enlarged, hemorrhages and cachexia supervened, and death followed. No particular types of disease of this nature were well recognized, however, until, in 1832, Hodgkin wrote his now well-known article on "Some Morbid Appearances of the Absorbent Glands and Spleen."[2] He reported a number of cases which showed an increase in the size of the lymph-glands and spleen, followed by emaciation, ascites, pallor, œdema, and death. The blood was not examined in any of the cases, and the report in many instances is meagre. One is able to discern, however, that undoubtedly the author's cases included carcinoma, tuberculosis, sepsis, and probably other morbid conditions. Nevertheless, it was the first worthy attempt to group this class of affections. In October, 1845, Bennet published the report of a case of hypertrophy of the spleen in which the blood of the patient contained a great number of white corpuscles resembling pus-cells. In November of the same year Virchow reported a similar case, and correctly attributed the large increase in the white cells to an augmentation of the white blood-corpuscles. He believed that the great increase in the leucocytes was due to the hypertrophy of the spleen. Subsequently, he evolved the doctrine of the disease, leukæmia, which he described as an affection characterized by cachexia, enlargement of the spleen and lymph-glands, and an augmentation in the number of white blood-corpuscles. Other histological changes of the disease described by him were cellular hyperplasia of the lymph-glands and spleen and infiltration of lymph-cells in the tissue of the liver, lungs, kidneys, and intestinal tract. Virchow recognized a lymphatic and a splenic form of leukæmia. In the year 1868 the work of Neumann and Bizzozero, on the hæmatopoietic function of the medulla of bone, gave rise to a new field of clinical observation, and soon a sufficient number of cases of leukæmia was recognized in which profound changes in the medullary substance of the bone were present to warrant a third subdivision of the disease—namely, myelogenic leukæmia. Shortly after Virchow's description of leukæmia, Bonfils, Trousseau, Wunderlich, Wilkes and others observed cases which presented extraordinary swelling of lymph-glands and spleen and many of the clinical features of leukæmia. It was noted, however, that the number of white blood-corpuscles was not increased. In order to distinguish these cases from leukæmia, Trousseau proposed the name *adenia*, by which the French still recognize the disease. Wilkes added that of *anæmia lymphatica*, or *Hodgkin's disease.* Wunderlich described it as *progressive glandular hypertrophy;* Virchow, as *lymphosarcoma;* Billroth, as *malignant lymphoma*, and Cohnheim, as *pseudoleukæmia.* Aside from the marked enlargement of the lymph-glands and spleen, the disease was characterized by pallor, hydrops, and a tendency to hemorrhages, cachexia, final marasmus, and death. The cases did not include similar clinical manifestations due to malaria, syphilis or any other apparent cause. The essential feature which distinguished the affection from leukæmia was the absence of an increase in the leucocytes. In many cases the lymph-glands only were enlarged; in other cases both the spleen and lymph-glands showed marked increase in size. To the first class of cases the older writers applied the terms *adenia, anæmia,* and *pseudoleukæmia lymphatica.* To the second class were applied the terms *adenia, anæmia,* and *pseudoleukæmia splenolymphatica.* More recently a relatively small number of cases have been reported, belonging to this class of diseases, in which the lymph-glands were unaffected, while the spleen was greatly hypertrophied. These cases present a most striking analogy to splenic leukæmia, the essential difference being in the alterations in the blood. The number of cases thus far recognized clinically does not exceed twenty-five, and the number of autopsies is still much smaller. The uniformity of the clinical and pathological features of the disease, however, establish the affection as a distinct morbid entity, which is, in reality, a splenic form of pseudoleukæmia. In 1856, Woillez described the first undoubted case of this disease under the title "Observations d'hyp. de la rate" (*Union Medicale*). His report referred to a man, forty years of age, who was taken sick without apparent cause. The disease was characterized by anæmia and a rapidly progressive course, which terminated in death. There was no increase in the number of leucocytes; the spleen measured 26 x 12 cm. Two enlarged glands were found in the mesocolon. The first case recognized as belonging to this type of disease was reported by Gretzel, from Griessenger's clinic, under the name of anæmia splenica.[1] Since the term anæmia splenica, by which the disease under consideration has been most frequently reported, originated with this case, I feel justified in giving its details: A child, ten months old, pale and weak from birth, with tendency to cough and diarrhœa, presented a moderate enlargement of the liver and a great enlargement of the spleen. The lymph-glands were palpable. The symptoms gradually increased in intensity until, at the end of six months, the child died. Multiple enlargement of lymph-glands was present everywhere. There was no leucocytosis. Autopsy by Cohnheim showed hyperplasia of normal elements of spleen, with incipient cirrhosis of the liver and lymph-glands. Griessenger recognized that the case differed from leukæmia solely in the absence of a leucocytosis. He, among others, believed that such cases should be given a distinguishing name. Cohnheim[2] had already applied the term pseudoleukæmia to such affections; but Griessenger had accepted the term anæmia lymphatica, proposed by Wilkes, as applicable to those cases in which the lymph-glands were chiefly involved. It was, therefore, natural for him to apply the term anæmia splenica to similar cases in which the splenic enlargement predominated. In reality, the case described from Griessenger's clinic belongs to that pathological state described more recently by v. Jaksch as anæmia infantum pseudoleucæmica. Müller reported seven cases of pseudoleukæmia.[3] Among the number was one which undoubtedly belongs to the form of splenic pseudoleukæmia. Autopsy showed moderate enlargement of the liver and marked enlargement of the spleen. The splenic hypertrophy was due to an increase in its normal elements. Under the name of anæmia splenica, Strumpell[4] describes a case which has been quoted by nearly all who have written on the subject since that time. Banti claims that this was undoubtedly a case of progressive pernicious anæmia. It certainly does not correspond to splenic pseudoleukæmia. To Banti[5] must be given the credit of first describing the affection in such a manner as to bring the subject clearly before the medical profession. Unfortunately, his publication was in Italian, which undoubtedly restricted its influence. He reported three cases, including two autopsies, from his own observations, and collected cases, previously reported, which he thought belonged to this class. He chose to perpetuate the term which Griessenger had applied, and described the affection as "anæmia splenica." Since then cases presenting the same clinical manifestations and pathological features have been described under various names. Debove and Bruhl applied the term splenomegalie primitive; Eichhorst, splenic pseudoleukæmia; Gaucher, idiopathic hypertrophy of the spleen without leucocythæmia. (For reports of other cases, see references.) The manifold nomenclature arising in part from the different theories held by the different authors regarding the nature of the disease gives rise to a certain amount of confusion concerning the affection. At best, the terms leukæmia, pseudoleukæmia, and splenic anæmia simply designate a certain grouping of clinical manifestations and pathological changes.

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[1] For the author's report of a case, see THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, October, 1899, vol. cxviii., No. 330, p. 428.

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[1] Archives Generales de Medicine, 1838.

[2] Medico-Chirurgical Transactions.

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[1] Berlin. klin. Wochenschrift, 1886.

[2] Virchow's Archives, Bd. xxxiii.

[3] "Uber idiopath. Milztumoren," Berlin. klin. Wochenschrift, 1867.

[4] Archiv der Heilkunde, 1875.

[5] "Dell' Anæmia Splenica," Archivo della Scuola d' anat. pathologica, 1883.

If the ordinary forms of Hodgkin's disease were described as anæmia lymphatica and anæmia splenolymphatica it would be consistent to apply the term anæmia splenica to the rare cases under consideration. However, since the term pseudoleukæmia is more often applied to such conditions, I believe the appropriate name for this form of the disease is splenic pseudoleukæmia.

ETIOLOGY. The etiology of splenic pseudoleukæmia is unknown. The disease does not appear to bear any direct relation to malaria, syphilis, tuberculosis, or alcoholism. It seems to arise independent of all constitutional disorders. The cultures obtained from the spleen in *my* case, both ante-mortem and post-mortem, contained no organism that could be regarded as specific, and the spleens of animals injected with blood from the spleen of the patient showed no changes. The microscopical examination of the spleen and other organs revealed no micro-organisms. In 1894, Sciolla obtained negative results from cultures made from the spleen ante-mortem. The negative results in the two cases mentioned do not, of course, exclude micro-organisms as a cause of the disease. However, certain features in connection with the disorder render it very improbable that a specific micro-organism is the etiological factor. The disease is extremely rare, and has never occurred endemically or epidemically. Isolated cases have appeared in different parts of the world. More cases have been recognized in Italy than in any other section. There appears to be no special predisposing cause of the disease.

PATHOLOGICAL ANATOMY. I find record of only about ten post-mortems in which it is reasonably certain that splenic pseudoleukæmia was the cause of death. As a rule, the cadaver presents a high grade of emaciation. In some cases the subcutaneous fat has been well retained. The skin and conjunctivæ are subicteric, and punctiform hemorrhages may be visible in different parts of the body. Usually the subcutaneous connective tissue of the dependent parts is infiltrated with serum, and œdema of the extremities is often present. Visible external glandular enlargement is seldom found, yet it is not rare to be able to palpate a few glands, the size of a bean or a hazel-nut, in the inguinal or axillary regions. The abdomen usually contains a variable quantity of ascitic fluid. Ecchymoses may be present beneath all the serous surfaces. The pericardial sac often contains a serous fluid. The heart is generally slightly dilated, and frequently presents signs of granular and fatty degeneration of its muscle, such as is usually found in severe anæmia. The pleural cavities often contain fluid, and when the spleen is extremely large, compression of the left lung may give rise to atalectasis of its lower lobe. In a few cases a real pleurisy has been present on the left side. Although nausea, vomiting, and diarrhœa may be prominent symptoms throughout the course of the disease, the gastro-intestinal tract does not present serious alterations. The glands at the base of the tongue have been found somewhat enlarged. Not infrequently Peyer's patches and the solitary follicles show slight hyperplasia. The liver is usually enlarged. In my case it weighed 2800 grammes, which exceeds by far the usual weight recorded in this affection. Its surface is smooth, the edges round, and the organ presents, as a rule, no visible signs of cirrhosis. On section, the organ is uniform in firmness, cuts easily, and its consistency is not apparently increased. Histology of the liver: The liver shows slight increase in its interlobular connective tissue. Infiltration of round cells is observed about the portal vessels and between the liver lobules. In a case reported by Banti there was considerable increase in the connective tissue, which he described as an interstitial perilobular hepatitis. The liver cells may be normal. Here and there, where there is considerable proliferation of connective tissue, the hepatic cells may be atrophic. The spleen is always increased in size, and often fills the greater part of the left half of the abdominal cavity. The normal size of the spleen is 12 x 8 x 3 cm.; its normal weight is 200 grammes. In my case it measured 31 x 16 x 9.5 cm. and weighed 2350 grammes. The normal shape and outline of the organ is preserved. Its surface is usually smooth, although in some cases areas of peritoneal thickening resulting from perisplenitis are present. Rarely peritoneal adhesions have been recorded. The organ is firm. In a case reported by Banti there was a visible increase in the connective tissue. Small white areas, about the size of a pea, were noted by him, which proved to be made up of increased connective tissue. In my case there was no macroscopic increase in the connective tissue. The Malpighian corpuscles were not visible. Histology: The Malpighian corpuscles are usually not markedly altered. Banti records considerable sclerosis of these bodies in one of his cases. He summarized his findings in the spleen as (1) atrophy and sclerosis of the Malpighian corpuscles; (2) the substitution of an irregular and fibrous reticulum for the normal fine reticular substance of the splenic pulp. The following quotation is from a case reported by West: "The spleen showed slight increase in the trabecular tissue—*i. e.*, slight fibrosis. Malpighian corpuscles are much diminished in size and badly developed. Iron reaction negative." For the changes in the spleen in my case the reader is referred to the histology given in the report. The kidneys are anæmic. The epithelium of the tubules may show signs of granulo-fatty degeneration. A real nephritis, however, is not present. The pancreas and adrenals are negative. The lymphatic glands are usually not enlarged. In some cases, however, isolated glands, or small groups of glands, especially in the retroperitoneal region, have shown slight enlargement. They are grayish and somewhat red, and firm in consistency. On section they show no softening, and the microscope reveals hyperplasia of both the principal elements. The mesenteric glands may show similar changes. The medulla of the bone often presents an appearance closely resembling that found in primary pernicious anæmia. In one of Banti's cases he notes that the medulla in the long bones was, as a rule, fatty; but that in both femora a fœtal condition of the marrow was present. In my case the compact tissue of all the bones was very much reduced, producing a considerable degree of brittleness. The sternum could easily be broken with the fingers. Throughout the length of the femur, tibia, and humerus the normal fat was replaced by dark red marrow. Indeed, red atrophy of the marrow was distinctly present in every bone examined, including, beside those mentioned, the ribs, clavicle, skull, vertebræ, and small bones of the feet. The blood changes found in the disease are described under the symptomatology.

SYMPTOMATOLOGY. The following description of symptoms is based on those present in my case, supplemented by a study of the cases most carefully reported. The manner of onset varies; as a rule, however, the disease begins very insidiously, so that it is often difficult to establish the period at which the first manifestations of the affection appeared. In many cases the first symptoms noted are cardiac palpitation on exertion, accompanied by a feeling of unusual muscular fatigue. Headache and slight pallor of the mucous membranes may be present. Early in the disease the appetite and digestion are usually good and the bowels regular. After a period varying from a few weeks to two or three months the attention of the patient is attracted to the existence of a tumor in the left hypochondriac region. The tumor is seldom painful, and disturbs the patient chiefly by a sense of weight and tension in that region. In some cases, as in my own, a tumor in the left hypochondriac region is the first symptom noted by the patient. Shortly after this discovery, owing in part, no doubt, to the mental concern of the patient in regard to his disorder, a feeling of weakness on muscular exertion is experienced. Following this may appear nausea and vomiting and at times persistent diarrhœa. Dyspnœa and cardiac palpitation on exertion may be rather prominent features. Now and then dizziness and headache may be experienced. Epistaxis is a common early symptom.

In other cases a tumor may appear in the left hypochondriac region, which may increase in size for nearly a year without any disturbance in the general health or even local disturbance, aside from a feeling of weight or tension in the part. After a variable time—seldom longer than a year—the symptoms of anæmia and general disorder in organic function supervene. In rare cases, as in one reported by Debove, the local phenomena referable to the spleen may be very distressing. Pain, paroxysmal in character, simulating hepatic colic, with attacks of nausea and vomiting, may accompany the gradual loss of muscular power and signs of anæmia. Examination of the patient may then reveal the signs of marked anæmia and a palpable tumor in the left hypochondriac region. It matters not what the mode of onset is; after the disease has developed the clinical picture will present the same essential features: (1) Hypertrophy of the spleen; (2) absence of marked lymphatic enlargement; (3) anæmia progressing toward a cachectic state. At this time the symptoms are all very pronounced, with the exception of pain, which may be only slight or entirely absent throughout the whole course of the affection. Debility is great; œdema appears, at first transitory in character, involving the ankles and wrists. A vespertine fever, preceded by chilly sensations, may be present. Gastro-intestinal disturbances, manifested in anorexia, indigestion, and diarrhœa, are present in varying degrees of intensity. Finally, within a period of a few weeks or months, the cachexia of anæmia becomes pronounced. Emaciation gradually increases. The skin and conjunctivæ become subicteric; pallor peculiar to profound anæmia appears. Muscular weakness confines the patient to his room or bed. Œdema becomes permanent and is associated with ascites and hydrothorax. Petechial hemorrhages on the extremities and in the mucous membranes evidence the high grade of malnutrition of the capillary walls. Persistent and often incoercible diarrhœa exhausts the patient, and involuntary evacuation of the bowels may announce the approach of dissolution. At the beginning of the cachectic stage the blood examination usually shows a grade of anæmia which approximates very closely the findings in chlorosis. As the cachexia increases the number of red blood-corpuscles, as a rule, diminishes, until finally, as in my case, less than one million per cubic millimetre may be registered, with hæmoglobin so slight in amount as to preclude the possibility of accurate estimation. At no time, however, is there a leucocytosis presenting the characteristics found in leukæmia. From a scientific as well as therapeutic stand-point it is extremely interesting to note that so far as may be gleaned from the histories of the cases, the splenic hypertrophy has preceded or at least has developed contemporaneously with the appearance of the anæmia. In no case belonging properly to this type of disease, so far as I have been able to discern, has the splenic hypertrophy followed the appearance of the anæmia. In the majority of cases the patient has not consulted the physician until his attention has been attracted to the tumor in the side. In my case the patient, naturally a quick observer, was not conscious of any unusual physical manifestation until he discovered a tumor a few inches below the costal arch in the left hypochondriac region. The fact that splenic hypertrophy is apparently the primary condition has an important bearing on the treatment of the disease. It also contributes much to the nature of this type as well as the other forms of pseudoleukæmia. As a rule, in the progress of the disease the size of the spleen bears a direct relation to the grade of anæmia. However, there are exceptions, in which the spleen is enormously enlarged before anæmia is pronounced. In still other cases anæmia may be profound when the splenic tumor is of moderate size. After cachexia develops the disease is usually rather rapidly progressive, and death is due to complications, or it follows a period of extreme marasmus. The disease may be divided into three stages. The first stage includes an indefinite period, during which the spleen begins to enlarge. The second stage may conveniently be said to include that period during which the symptoms of anæmia develop, accompanied, as a rule, by gastro-intestinal disturbances and general asthenia. The third stage is that of cachexia. This stage is usually ushered in with œdema, followed by a somewhat regularly progressive aggravation of all the symptoms of the previous stages, and finally terminates in extreme marasmus and death.

Special Symptoms. *Splenic Hypertrophy.* So far as is known, all the disorders of the spleen that are of clinical importance are accompanied by its enlargement. Splenic pseudoleukæmia presents as one of its essential features an enlargement of the spleen. The enlargement is uniform, constituting a true hypertrophy in a clinical sense. Its size varies with the stage of development of the disease, and is not the same in all cases. The spleen enlarges gradually, and is not subject to marked fluctuations in size. Owing to the fact that the first stage of splenic enlargement is seldom observed, it is impossible to estimate its rapidity of growth from the beginning. In my case, after the spleen was first palpable, it gradually enlarged until its lower border reached a point two fingers'-breadth above the pubic bone, and its inner border extended beyond the median line, the patient in the upright position. In this case it appears that the enlargement was exceptionally great. Usually the organ extends no further than one or two hands'-breadth below the costal arch. Its outline is symmetrical. As a rule, no irregularities are to be felt, either on its margin or surface. Its consistency is firm. The splenic notch occupies its usual position. The organ is respiratory, movable in a diagonal direction, peculiar to splenic enlargement, and permits of lateral movement. Pain on pressure may or may not be present. In my case a loud souffle was to be heard all over the enlarged organ. In some cases friction rubs, due to perisplenitis, have been heard. A perisplenitis may result in local thickenings that may be felt as irregularities on the surface of the organ. When the enlargement is marked the left half of the abdomen is more prominent than the right, and the region of the left costal arch appears bulging. In my case, just previous to death and at the time of great diarrhœa and involuntary discharges, the spleen was reduced fully two inches in its various diameters. The enlargement of the spleen may be unaccompanied by pain. In the majority of cases an uncomfortable sensation of weight and fulness in the left hypochondriac region leads to the discovery by the patient of the tumor. In rare cases neuralgic pains or paroxysms resembling hepatic colic, accompanied by obstinate vomiting, appear as early manifestations of the disease. At times the pain may be so intense as to demand radical means for its relief. The explanation of the pain is not always apparent. A perisplenitis is often found, but pain has been a marked feature when such a condition was not present. In all cases when pain exists it is increased by pressure.

Lymph-glands. The lymph-glands may remain normal in size throughout the course of the disease. It is not uncommon, however, for the post-mortem to reveal enlargement of the retroperitoneal and bronchial glands, either isolated or in groups. The glandular hypertrophy, if present, is always moderate. In a few cases, after splenic hypertrophy had existed for a long time and the symptoms of the disease were well developed, small kernels have appeared in the axillary and inguinal regions. The glands at the base of the tongue and the tonsils have been found enlarged.

Liver. The liver is nearly always considerably enlarged; its surface and outline are regular, its consistency firm, and its lower border sharp. Perihepatitis may occur.

Anæmia. Anæmia is one of the characteristic features of the disease. So far it has not been recorded in any case that the signs of anæmia preceded the development of splenic hypertrophy. The symptoms of anæmia develop gradually during the second stage of the affection, until that state of profound alteration of general nutrition is reached which is clinically designated by the term cachexia. During this stage dizziness, tendency to syncope, headache, dyspnœa on exertion, and cardiac palpitation are present in variable degrees of intensity. Pallor of the mucous membranes gradually develops. Hæmic heart-murmurs may be heard. The skin assumes a hue peculiar to anæmia—pallid at first and later on of a yellowish tinge. The conjunctivæ become slightly subicteric. Epistaxis, such as may occur in anæmia from any cause, is often a frequent and early symptom. The hemorrhage is seldom profuse. The advent of cachexia is characterized by a tendency to œdema and effusion into serous cavities, marked asthenia, hemorrhages, fever, and an aggravation of all the pre-existing symptoms. The mucous membranes become exceedingly pale. The carotids pulsate visibly. Capillary pulse may be present. A venous hum is often noted. The patient gradually emaciates. Persistent diarrhœa often supervenes in the later stages, and anæmia progresses to the highest degree. A period of extreme marasmus finally terminates in death.

Cachexia. The cachexia of splenic pseudoleukæmia does not differ from the cachexia of carcinoma, tuberculosis, or any other profound disturbance of nutrition. Although epistaxis is frequently an early symptom, hemorrhage from other organs than the nose seldom takes place until cachexia develops. During this stage hæmatemesis, hæmoptysis, melænæ, and hæmaturia have been observed, and petechiæ of the skin and mucous membranes is common. Retinal hemorrhages are to be expected.

Fever. Fever may be present during the early stage of the affection. It is a variable symptom, and may be absent for weeks at a time, and then irregular pyrexia may develop. It may be due to a localized peritonitis. Pyrexia independent of local causes is seldom pronounced until the stage of cachexia, when from time to time an afternoon temperature of 102° may be registered. The fever is similar to that which is present in leukæmia and all grave anæmiæ. No satisfactory explanation has ever been given for its occurrence.

Circulatory Symptoms. The heart may be slightly dilated; hæmic murmurs are often heard, especially in the later stages. The carotids and other large arteries throb visibly, and a capillary pulse is not infrequently noted. The pulse is full and frequent, and may approach the water-hammer character. The veins are often prominent, and the bruit de diable may be heard in the neck.

Pulmonary Symptoms. Râles due to compression of the lung by the splenic tumor are often present at the base of the left lung. Dyspnœa, due to deficient hæmoglobin and the elevation of the diaphragm, is experienced.

Digestion. As a rule, the appetite is fair until the disease is well advanced, when it gradually fails. Nausea and vomiting may be early symptoms, and when associated with paroxysms of pain in the region of the spleen may cause much distress. The gastric disturbances may be due to pressure, or, possibly, may be reflex through involvement of the sympathetic nervous system. Diarrhœa may be an early symptom and persist for several weeks or months. Constipation often alternates with diarrhœa. Toward the end diarrhœa may be incoercible, and at last involuntary evacuations may take place. Hemorrhage from the stomach has been recorded.

Nervous System. The symptoms referable to the nervous system are those chiefly of anæmia—namely, vertigo, headache, neuralgia, and mental fatigue. The mind usually remains clear until near the end.

Blood. The blood varies with the stage of the disease. In the beginning of the affection there is only a slight reduction in the number of red blood-corpuscles and a relatively greater diminution in the hæmoglobin. After the disease is well advanced the blood is very pale and thin. Its coagulability is very much reduced. Red blood-corpuscles: The red blood-corpuscles are, as a rule, very much diminished in number. In the few cases in which they have been counted the results have ranged from about 4,000,000 to 568,000 per c.mm.; the average case will show about 2,500,000 per c.mm. at the beginning of the stage of cachexia, and as the disease progresses the number usually decreases. There is no marked alteration in the form and size of the corpuscles. Poikilocytosis has not been recorded. The corpuscles are pale. Nucleated red blood-corpuscles have not been observed. Rouleaux formation is absent in the later stages. The hæmoglobin is reduced in quantity; the individual corpuscle contains less hæmoglobin than normal. The color index, however, does not seem to be as low as in chlorosis. In my case, although the hæmoglobin was reduced to 10 per cent., the color index was never lower than about 0.85. White blood-corpuscles: In the majority of cases the leucocytes are normal in number, and the relation of the different forms is not disturbed. No abnormal elements have been recorded. In one of Banti's cases the number was increased to 19,805 per c.mm., but in this case pneumonia was present as a complication. In Franzolini's case five times the normal number were found. Under such circumstances the character of the leucocytes alone would enable one to differentiate the disease from splenic leukæmia.

Urine. The urine is normal in quantity and may not show special changes. A large quantity of nucleohistone was found by Stein in a clinical case of splenic pseudoleukæmia. The solids of the urine are not altered in a characteristic manner. A trace of albumin has been found. Signs of extensive degenerative changes in the kidney have not been observed; sugar is absent. I was able to produce alimentary glycosuria by administering a moderate quantity of glucose. This was due, no doubt, to impairment of the function of the liver.

DIAGNOSIS. Essential to the diagnosis of splenic pseudoleukæmia is (1) an idiopathic splenic hypertrophy; (2) a progressive anæmia without a leucocytosis presenting the characteristics found in leukæmia; (3) the absence of marked lymphatic enlargement. Since neither signs of anæmia nor local sensations have been noted previous to the development of splenic hypertrophy, the disease could scarcely be suspected before the spleen was palpable. In relation to splenic hypertrophy, one must determine whether the palpable structure in the left hypochondriac region is a splenic tumor, and, if so, its nature. As a rule, tumors of the spleen present less difficulty in diagnosis than those of any other abdominal structure. They emerge from beneath the left costal arch and cling closely to the abdominal wall, overriding all structures in the abdominal cavity. Their development is downward, along a line which is directed toward the right pubic bone.

Splenic enlargements are respiratory movable, and in a diagonal direction, which is peculiar to splenic tumors. All other structures attached to the diaphragm have a tendency to move in a line parallel with the long axis of the body. A variable degree of lateral motion is permitted. The structure is uniform in consistency, outline, and surface, which constitutes a true hyperplasia in the clinical sense. Unless the spleen is dislocated it is impossible to grasp its upper margin, but the palpating finger rests on a smooth surface, which seems to be a part of a structure which extends upward beneath the costal arch. Its inner and lower margins are readily palpated, and the lower pole may often be grasped, which is characteristic of splenic enlargements. The inner margin is notched. The dulness on percussion over the structure in the abdominal region is continuous with that of a uniform dulness in the splenic region, extending often to the eighth rib in the post-axillary and the sixth rib in the anterior axillary line.

Tumors of the kidney are usually fixed, and their development from the lumbar region is evident on bimanual palpation. They develop, as a rule, downward, and, unless extremely large, seldom encroach upon the diaphragm. Urinary symptoms are often present, and the colon may be demonstrated as lying in front of the kidney mass.

Enlargement of the left lobe of the liver may present some difficulty in diagnosis. Under such circumstances the direction of the respiratory mobility, and, above all, the continuity of its lower border with the lower border of the liver in the epigastric region, would serve as distinguishing features. Having determined that the mass in the left hypochondriac region is a splenic structure, the nature of the enlargement must next be considered. It is characteristic of splenic hyperplasia that the form and outline of the normal spleen is retained. A neoplasm, such as carcinoma of the spleen, is to be excluded, or at least can scarcely be diagnosed in the absence of irregularities in the structure. Acquired syphilis rarely produces great enlargement of the spleen in the early stages of the disease, and still more rarely as a tertiary manifestation, excepting when combined with amyloid degeneration. The history, presence of amyloid elsewhere, and other signs of syphilis would render the diagnosis easy.

Enlargement of the spleen from tuberculosis would rarely present any difficulty in diagnosis. Echinococcus of the spleen is to be distinguished by its long course without general symptoms and the presence of fluctuation. In case of doubt, puncture would clear up the diagnosis. After having excluded all forms of neoplasm and cyst a hyperplasia of the spleen may be assumed. Its nature would then require careful consideration. A differential diagnosis should be made between the morbid states which are accompanied by a splenic hyperplasia, namely, leukæmia, malarial cachexia, passive congestion, progressive pernicious anæmia, amyloid spleen, and Banti's splenomegalia with hepatic cirrhosis.

Splenic Leukæmia. The clinical phenomena are so nearly identical in the two affections that a blood examination shows the only essential difference between them. A slight increase in the polynuclear variety of leucocytes may be present in splenic pseudoleukæmia. In one of Banti's cases there was an absolute leucocytosis, but the blood examination was not made until the day upon which a pneumonia developed. In this and in a few other cases in which a moderate leucocytosis has been present the quality of leucocytosis has not been accurately stated. In the diagnosis of leukæmia, when leucocytosis is only moderate, the quality of the leucocytes, not their number, determines the diagnosis. Essential to the diagnosis of leukæmia with moderate leucocytosis is the increase in the mononuclear elements, which often show degenerative changes in their nuclei. As a rule, in splenic pseudoleukæmia there is a normal number of leucocytes, and the relation of the different forms is not disturbed. The number of red blood-corpuscles is at first moderately reduced. Later in the disease the number may be diminished to two million or one million, or, as in my case, to a little more than half a million per cubic millimetre. Change in size and form of the red blood-corpuscles is not marked. The individual red blood-corpuscles are poor in hæmoglobin and rarely contain nuclei. A more extended account of the blood in splenic pseudoleukæmia is to be found under symptomatology. The differential diagnosis between the clinical pictures presented by splenic pseudoleukæmia and splenic leukæmia is to be made only by a study of the white blood-corpuscles.

Malarial Cachexia. The form of malaria known as malarial cachexia, characterized by enlargement of the spleen and anæmia, presents clinical phenomena very closely simulating splenic pseudoleukæmia. Splenic hypertrophy, enlargement of the liver, and anæmic cachexia are essentially the same in both affections. Indeed, it must be admitted that a positive differential diagnosis between the two conditions could not be made under certain circumstances; as a rule, however, the differential features are sufficiently prominent to leave no doubt as to diagnosis. In all cases so far reported which are to be included in the category of splenic pseudoleukæmia, malaria has been carefully excluded as an etiological factor. A malarial cachexia, developing, as it sometimes does, in intense malarial districts, without chills, would present features requiring great care in diagnosis. In doubtful cases the presence of the plasmodium in the blood would, of course, be conclusive evidence as to the nature of the disease. Blood-pigment in the white blood-corpuscles, or free in the plasma, has not yet been noted in quantities approaching that found in malarial cachexia. The pigmented skin is a slate or dirty yellow color, peculiar to chronic malaria. In splenic pseudoleukæmia pallor is combined with subicterus. In districts where malaria is intense a nephritis not infrequently complicates the disease, while it has never been noted in cases of splenic pseudoleukæmia. Inhabitants of a malarial district who have never had the usual manifestations of malaria, as well as those who unquestionably have suffered from the disease, may develop splenic hypertrophy, which often persists for a long time, even a period of years, without the appearance of anæmic cachexia or serious disturbance in general health. Splenic pseudoleukæmia is characterized by a splenic hypertrophy which is directly associated with or very soon followed by a progressive anæmia, which invariably continues to cachexia, with fatal termination in a definite period of time unless the disease is arrested. The therapy which in time will relieve a malarial cachexia has no particular effect on splenic pseudoleukæmia.

Essential Anæmia. In *chlorosis* the blood findings and clinical phenomena of the early course of the disease may be very similar to those of splenic pseudoleukæmia. However, in chlorosis the splenic enlargement is absent or seldom marked, and when present follows rather than precedes the development of the anæmia. The course and effect of treatment in the two affections is entirely different.

In *primary progressive pernicious anæmia* the cachexia, course, and clinical phenomena resemble the manifestations of this disease in many particulars, but the blood findings and splenic hypertrophy present differences sufficiently great to establish the diagnosis. In primary progressive pernicious anæmia the individual corpuscle is relatively rich in hæmoglobin, while in pseudoleukæmia it is poor. There is a much greater difference in the size and form of the red blood-corpuscles in primary progressive pernicious anæmia. Nucleated red blood-corpuscles are rarely, if ever, found in splenic pseudoleukæmia, while they are constantly found in primary progressive pernicious anæmia. The large form of nucleated red blood-corpuscle—the gigantoblast—of special importance in the diagnosis of primary progressive pernicious anæmia, has never been found in splenic pseudoleukæmia. In primary progressive pernicious anæmia the spleen is more often atrophied than enlarged. The enlargement, if sufficient to be detected on palpation, is never great, usually shows fluctuation in size under treatment, and always follows the development of anæmia. Mosler and Gast believe the enlargement of the spleen in chlorosis and primary progressive anæmia to be a compensatory hypertrophy directly connected with the regeneration of the blood. Other authors, as Immermann, Eichhorst, Müller, and Neumann, do not believe that under such circumstances the spleen returns to its prenatal hæmotopoitic function. By others the splenic enlargement in the anæmiæ is thought to be due to the increased destruction of red blood-corpuscles. The liver is nearly always hypertrophied in splenic pseudoleukæmia. In primary progressive pernicious anæmia it is not.

Passive Congestion of the Spleen. In this condition the etiological factors of a liver cirrhosis or other conditions inducing splenic hyperæmia would nearly always be evident. The course of the two diseases is somewhat different. The development of anastomoses between the portal and general circulation, and the other signs of liver cirrhosis, such as early appearance of ascites and late appearance of cachexia, characterize the spleen of passive congestion. The enlargement of the spleen in passive congestion is moderate in comparison to the enormous hypertrophy sometimes present in splenic pseudoleukæmia. In atrophic cirrhosis the liver is small, while in splenic pseudoleukæmia it is hypertrophied. On the other hand, cirrhosis of the liver accompanied by marked fatty infiltration and enlargement of the organ presents clinical features which under certain circumstances might give rise to great difficulty in diagnosis.

Amyloid Spleen. The diagnosis of amyloid spleen is to be made only when a sufficient cause has preceded its development, such as long-continued suppuration of bone or soft parts, phthisis pulmonum, or protracted syphilis. Evidence of amyloid degeneration elsewhere is to be desired in connection with its etiology. Although the spleen is usually the first organ to show amyloid changes, the diagnosis of amyloid spleen without signs of amyloid liver, kidneys, or intestines would be at best a probable diagnosis.

Splenomegalia with Cirrhosis of the Liver. Banti[1] describes a condition characterized by splenic hypertrophy associated with cirrhosis of the liver, in which he believes the primary disease is of the spleen, and that the cirrhosis of the liver results from the pathological changes in the spleen. The clinical difference between the affections is so slight that Banti admits that on that alone no distinction between the two affections can be made.

The diagnosis of splenic pseudoleukæmia is often surrounded by many difficulties. In all cases the evidence must be accurately obtained and the proper valuation placed on it to ensure trustworthy results. Undoubtedly, there are cases in which it would be advisable to withhold a positive diagnosis for a variable period of time.

COURSE AND PROGNOSIS. The disease presents a definite course within certain limits of variation. Its tendency is distinctly progressive. The severity of symptoms may show slight remissions; but, on the whole, it will be observed that the patient loses ground rather steadily from month to month. It is difficult to estimate the exact duration of the disease, owing to the uncertainty of the length of the first stage. In some cases a fatal termination has been reached in five or six months after the first symptoms were manifest. The average duration appears to be about two years. My case terminated in about three and a half years from the time the splenic enlargement was first noticed. That duration seems to be about the longest recorded. While the first and second stages of the disease may vary and be prolonged for a period of one or more years, the cachectic stage seldom continues more than a few weeks or five or six months. Death results from progressive marasmus and intercurrent disease. Medical treatment seems to be of no positive value in controlling the progress of the disease. The removal of the spleen has arrested the process in the cases noted in the chapter on treatment. The prognosis is decidedly unfavorable without surgical intervention.

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[1] Semaine Med., 1894, xiv. 318, and Ziegler's Beitrage, 1898.

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REVIEWS.

THE MEDICAL COMPLICATIONS, ACCIDENTS, AND SEQUELÆ OF TYPHOID OR ENTERIC FEVER. By HOBART AMORY HARE, M.D., B.Sc., Professor of Therapeutics in the Jefferson Medical College of Philadelphia, etc., with a Special Chapter on the Mental Disturbances following Typhoid Fever, by F. X. DERCUM, M.D., Clinical Professor of Diseases of the Nervous System in the Jefferson Medical College. Philadelphia and New York: Lea Brothers & Co., 1899.

CAN anything new be said about typhoid fever, a disease so widespread, so carefully observed, so critically studied, so voluminously written about, that knowledge concerning it would seem to be wellnigh complete and additional literature superfluous? Can even the industrious Hare glean from his own rich experience or that of others aught that is fresh concerning the medical complications of this preventable, disgraceful, filth disease? One must answer both no and yes. The facts concerning the atypical clinical manifestations of the affection, the numerous statistics, are largely gathered from authors who are dead or whose works are already well known. Louis, Fagge, Murchison, Liebermeister, Wunderlich, Immermann, Osler, and Fitz are men whose writings on typhoid are classic, though in some instances of recent date. There is, we might say, nothing new in this respect. But, on the other hand, there is much that is new unless one has kept in closest touch with the most recent literature. It is not so much, perhaps, the new fact that is of importance as it is the new point of view from which a fact is observed. Bacteriology has completely modified our conception of the disease. In its light even those dry old statistics have a glow of life. Instruments of precision and improved technique have made diagnosis surer. The Widal test, the Ehrlich reaction, the examination of the blood for leucocytosis or for bacilli clears up many a doubtful diagnosis. Pneumonia, cystitis, meningitis, cholecystitis, etc., long viewed as accidental or intercurrent affections, wear an entirely new aspect when viewed as localized manifestations of the working of the specific organism. Typho-malarial fever is banished or rightly looked upon as a double infection, typhoid and malaria; apyretic, mild, and abortive cases are more easily recognized, and cases that might escape the notice even of the morbid anatomist, because of absence of intestinal lesions, are made clear by the bacteriological test. It is, after all, the same old disease of Louis and Murchison and Liebermeister, with the same complications, but yet completely changed, because we have changed our point of view, even admitting that there have been some modifications in type as compared with the disease of the preceding generation, due to improved therapy and acquired relative immunity. To one who is not fully alive to the newer conception of typhoid, Hare's book is of the greatest value, for it treats of the subject in the light of the most recent knowledge.

As the reviewer reads the pages one after another he is forced to nod mental approval of both the statements of facts and conclusions reached, and to approve of the manner of expression. Though on the alert to find some faulty statement, he rarely has the fortune—good fortune from the critic's point of view—to be able to use the blue pencil of disapproval. Even grammatical and typographical errors are so scarce that it sent a chill—no, a typhoidal, cold, creepy sensation—up his back when he found one grammatical slip and detected a paragraph inserted several pages from its proper place (p. 163). This latter mistake leads us to speak of one of the merits of the work—viz., that it is quite up to date. Even as the book was going through the press several insertions were made, so that many references are to literature as late as April, 1899. Such a late "insert" has been put in (p. 163) under the head of thrombosis and embolism, though properly coming under the heading of hysteria.

There has evidently been a most careful study of standard works on medicine, and of monographs and special articles on typhoid fever, and a ransacking of indexes for facts and illustrative cases. There is liberal citation of authorities, free use of histories of cases of others and of one's own. In most instances references are given. So numerous are these and so exact that the book is really extremely valuable for its bibliography of typhoid. For while the author would not claim that a complete bibliography of typhoid complications and sequelæ is to be found here, yet it is no exaggeration to say that the chief references are here given, and one that would readily lead to others of a similar sort.

If one were disposed to be hypercritical one could pick out here and there abstracts of articles or histories of cases that might with advantage be condensed. We cite one instance: The unusually excellent article of Eshner on "Orchitis as a Complication of Typhoid" deserves mention, and his views should receive marked attention, but it would seem better to give his main points and conclusions, and to omit the table. Any one we believe interested enough to consult the table will look up the original article.

Again, an occasional doubt as to a correct diagnosis arises in the mind of the reader as to some of the odd atypical cases of typhoid where there is absence of autopsy, Widal test, rose-spots, or some fairly positive evidence.

It is impossible in treating a subject of this character to stick closely to the text, and our author, as he himself says, has found it difficult to avoid stepping over the dividing line between the ordinary symptoms and manifestations of the disease and those that are unusual or complicating. And we agree with him that a complete discussion of a complication may necessitate the consideration of the typical or common phenomenon of the malady. Once in a while, however, it has seemed to us that he has strayed a little further than was necessary or even wise—*e. g.*, on pages 79 and 80, where he discusses diagnosis. And to our mind the chapter on "Diseases that Ape Typhoid Fever" should be omitted entirely or enlarged. As it is, it is too sketchy and outlinear to be of more than suggestive value or to conform to the thoroughness and completeness of the rest of the book.

We have noted but few omissions, few statements of fact from which we would dissent. Diphtheria as a complication is not specifically mentioned (p. 110), though membranous pharyngitis is referred to. Cases of diphtheria complicating typhoid are on record with bacteriological and post-mortem demonstration. We wish more emphasis had been laid upon the slow pulse as the rule in ordinary typhoid. Even though Liebermeister, Leube and many others have declared it to be of extreme value from a diagnostic and prognostic stand-point, many authors to-day lay, as it seems to us, too little stress upon the pulse that is slow in spite of high temperature, as the normal condition in the average typhoid. When one goes through a ward and sees on one temperature chart after another a pulse of less than 100 with temperatures between 102° and 105°, and this continuing even to convalescence, one realizes that Liebermeister is justified in saying that a good pulse in typhoid fever rarely rises above 110. This fact is mentioned by Hare, but not with the emphasis that it warrants, at least so it appears to us.

On pages 121 and 122 the question is discussed as to whether diarrhœa is indicative of a mild or severe infection. Hare in reality leaves the question open, saying: "In all probability diarrhœa is neither indicative of a severe nor a light attack in many cases, although if it be violent the exhaustion produced by the discharges may seriously imperil the patient's chances of recovery." The writer has learned to dread the cases with diarrhœa; cases with constipation cause far less anxiety. And we dissent from the statement that tympanites is less frequently present in cases with active diarrhœa.

The work is systematically arranged. After a preliminary chapter on "General Considerations" there are discussed varieties of onset, the aberrant symptoms, states, or complications of the well-developed stage of the disease, the complications of the period of convalescence, the conditions which ape typhoid fever, duration and immunity to second attacks, the mental complications. In each chapter there is an orderly treatment of the complications as they affect the various organs or systems of organs of the body.

The last chapter, on "The Mental Complications," is written by F. X. Dercum, and is a clear portrayal of the mental conditions associated with typhoid fever, conditions too often loosely grasped by the practitioner under the comprehensive term of typhoid or post-typhoid insanity. The dividing line between the different varieties is clearly drawn by Dercum, and he emphasizes what has already been previously referred to by Hare in other places, that overmedication may at times produce complications or conditions that simulate them. Extremely interesting are the cases of Dercum's (pp. 225 and 271), where the too free use of alcohol induced typical alcoholic neuritis, with, in one case, delirium. Overmedication and overfeeding may likewise be held accountable for some of the gastro-intestinal disturbances that are sometimes wrongly attributed to the disease.

No one can fail to be interested in reading this book, and even though well up in the current literature of typhoid one will profit by the reading. It is a good thing to compare notes, and there is no physician of even a few years' practice who cannot, as he reads, make mental comments by comparison with his own experience. Judged by this test, always a severe one, as well as by other tests, the work deserves the highest praise. It treats the topic from a modern, scientific stand-point, is rich in illustrative cases, contains ample literary references, and is full of suggestive practical hints. J. B. H.

A Text-book of Pharmacology and Therapeutics on the Action of Drugs in Health and Disease. By Arthur R. Cushny, M.A., M.D. Aberd.; Professor of Materia Medica and Therapeutics in the University of Michigan, formerly Thompson Fellow in the University of Aberdeen, and assistant in the Pharmacological Institute of the University of Strassburg. Illustrated with 47 engravings. 8vo. pp. 730. Philadelphia and New York: Lea Brothers & Co., 1899.

This volume of Dr. Cushny's on Therapeutics is dedicated to Oswald Schmiedeberg, of Strassburg. The introduction deals with the mode of action of drugs, their elective affinity, their remote and local effects, their chemical composition and pharmacological action, the conditions modifying the effect of drugs, methods of administration, clinical characters of drugs, and their classification. In this part the author states that the scientific clinician is imbued with the desire to ascertain the method in which drugs act as well as to cure disease, and thus unite clinical observation with pharmacological research. He believes that laboratory experience and the bedside results are necessary to a complete knowledge of the action of a drug. In his classification of drugs he follows Bucheim and Schmiedeberg, and divides them into six kinds. In the first division we find organic substances, which are characterized chiefly by their local action. This includes the demulcents, emollients, sugars, and flavoring substances, simple bitters, volatile oils, skin irritants and counter-irritation, vegetable purgatives, vegetable astringents, and anthelmintics. The second division of drugs is organic substances characterized chiefly by their action after absorption. In this part he takes up alcohol, holding with his teacher, Schmiedeberg, that it does not excite but depresses the central nervous system from the beginning. He regards alcohol as a food, for in undergoing combustion alcohol gives energy to the body, and therefore is technically a food. He states that alcohol acts as a substitute for fats and carbohydrates in the food to some extent. As to the action of chloroform, the author believes that all exact experiments of the last few years show that the respiration fails before the heart, and that from a practical point of view it is of comparatively little importance whether there are a few fluttering beats of the heart after the last inspiration or not. The all-important question, he believes, is whether the heart has been so injured as to be unable to carry on the circulation, and this is decided by the concentration of the vapor that has been inhaled. For strychnine-poisoning he advises the inhalation of chloroform instead of the administration of chloral. The advantage of the anæsthetic over the chloral is that it can be stopped if any symptoms of strychnine paralysis appear. In opium-poisoning he advises the use of caffeine, either hypodermatically or in the form of strong coffee by the stomach. He also favors the use of atropine, but only in small doses, as large ones depress the centre of respiration. He thinks caffeine preferable to atropine, as it is scarcely possible to paralyze the respiratory centre with it. In treating of ipecacuanha, he writes that it was formerly largely used as an emetic, but is less suitable for this purpose than apomorphine, which acts much more rapidly, especially when injected hypodermatically, and which is followed by less nausea and discomfort. I fear the majority of the profession will employ ipecacuanha in preference. In the third division of drugs, he takes up the combination of the alkalies, alkaline earths, acids, and allied bodies. In treating of calcium salts the author states that rickets is not due to a lack of lime in the food, nor, in fact, in the tissues generally, but to some abnormal condition which prevents the lime salts from being deposited in the bones, although they are present in abundance in the blood. The author holds that from this fact it follows that lime salts are not likely to be of benefit in rickets (and the same holds true in osteomalacia), unless when it is due to lime starvation, a condition which is unlikely to arise in the human subject. The author does not think that the lime treatment of hæmophilia and aneurism is of much value, for it would seem to be very improbable that the absence of coagulation is due to deficiency in the lime salts, for much more is taken in the food than is sufficient for the organism, and the pharmacopœial salts are not more easily absorbed than the combinations present in food. In the fourth division he takes up the heavy metals. He holds that when a solution of a metallic salt comes in contact with a living tissue, such as the mucous membrane of the mouth or stomach, the albuminate is at once formed, and the acid with which the metal was combined is set free. The character of the local action of the salt depends upon these two factors—the nature of the precipitate and of the acid. The author finds that the most powerful corrosive salts of any metal are those in which it is combined with the corrosive rapidly dissociated acids—that is, the chlorides and nitrates, provided they are soluble. The least corrosive of the salts of the metals are those formed with the slowly dissociated organic acids, such as the acetates. In the fifth division of drugs he has the ferments, secretions, and toxalbumins. In this section he gives the latest views upon the internal secretions, speaking of iodothyrin, of the thyroid and of epinephrine of the adrenals. In the sixth division he takes up the mechanical remedies.

In this work the physiological action of a drug is not treated so much *in extenso* as in Dr. H. C. Wood's *Therapeutics*—only the results of investigations are given. In the literature of physiological experiments, he seems to have chiefly consulted German authorities, for many original American contributions have apparently been overlooked. The part of the work on the application of remedies to disease is quite full and up to date; while there may be some dispute about the author's estimate of certain drugs in disease, yet he always gives reasons for his views.

Dr. Cushny has ably performed his task of collecting and bringing together the opinions and experiences of the most eminent writers as to the real value of the articles of the materia medica in the treatment of the disease. Taking the work as a whole, it displays considerable originality and does great credit to the author. He seems to have included all the drugs used at the bedside, even heroin. It is a very suitable text-book for students, and will be of considerable advantage to the busy practitioner, to keep abreast of the very latest advances either in the laboratory or at the clinic. I. O.

THE MECHANICS OF SURGERY, comprising Detailed Descriptions, Illustrations, and Lists of the Instruments, Appliances, and Furniture Necessary in Modern Surgical Art. By CHARLES TRUAX. Chicago, 1899.

THIS is a large volume of over a thousand pages, and at first sight appears like an instrument-maker's catalogue, minus the prices. The author states that his aim has been "to illustrate and describe such mechanical appliances as research and experience have proved to be suitable or best adapted to the purposes for which they were designed." This he has done in a fairly acceptable manner. Also, he states that text-book descriptions are usually unsatisfactory, but that "the instrument-maker, on the other hand, who happens to be of a mechanical turn of mind and fairly well informed in operative surgery, can usually give judicious advice in the selection of instrument patterns." This is more true of the inexperienced than of the experienced surgeon. Another of the author's objects is to secure a standard nomenclature for surgical instruments. For this effort he is deserving of all praise. He thinks there is a place in the library of every practitioner of medicine or surgery for such a book, and states that "if this volume fails to fulfil the expectations of its author, it may perhaps serve as a stimulus to some abler mind to prepare a work which will better meet all requirements." The author evidently appreciates the fact that there is wanting a work which will elucidate the mechanics of surgery. That this is so there can be no doubt. That the book has taken the form it has is consequent on the fact that its author is an instrument-maker and dealer. Instead of a treatise on principles of mechanics as applied to surgery, we have detailed descriptions of instruments; instead of discussing the best means of accomplishing an object, he gives a description of the various appliances which are used. What would be of service is his candid opinion of the relative merits of the various instruments, with his reasons therefor; but that evidently is too much to expect of one who is financially interested in the various instruments he describes. The author evidently appreciates what should be done, for we get glimpses of his possibilities in his discussion of the manner of holding a needle and in his short comments on the mode of use of various instruments. He knows, but he has not the courage to state his convictions. Personally, we do not think that the book is scientific enough to deserve success; it still breathes too much of the trade spirit. Surgeons want a book written from the stand-point of a user not a seller of instruments; they want to be informed as to utility not fashion. Principles live, but fashions change. The book is, however, much better than a mere catalogue, and the author deserves some praise for taking a step in the right direction, even though it be not so decided a one as the subject demands and the author himself is capable of making.

G. G. D.

LA VIE SUR LES HAUTS PLATEAUX (LIFE ON HIGH PLATEAUX). Par LE PROF. A. L. HERRERA et LE DR. D. VERGARA LOPE, Anciens Presidents de la Societe "Alzate," Mexico. Awarded the Hodgkin's Prize silver medal of the Smithsonian Institution, Washington, D. C., 1895. Royal octavo, pp. 792. French translation with numerous plates. Mexico, 1899.

THIS immense work is dedicated to President Diaz, of Mexico. . It will be remembered that the first prize of $10,000 was awarded to Lord Rayleigh and Prof. William Ramsay, of London, for their discovery of argon in the atmosphere. The Mexican work seeks to demonstrate what seems to be a fact, that both vegetable life and animal life attain a higher degree of perfection at the high elevations found in the plateaux of Mexico. In both men and the lower animals tuberculosis is very rare. In 1885, out of 70,000 cattle killed in the general abattoir of the city of Mexico, after very careful examination, 45 only were found to be tuberculous. The authors give a good description of the country, the distribution of plant-life, with especial reference to altitude, the influence of climate on the development of plants, the vertical distribution of vertebrates and the effect of high altitudes upon them. This portion of the work is copiously illiustrated with engravings of various domestic animals, and makes a very interesting portion of the volume. The authors then take up anthropometry and the physiology of man in the higher altitudes, with statistics and other observations on the prevalence of various diseases. The higher elevations are proved beyond question to be far more healthy than other portions of Mexico. The mortality caused by tuberculosis is four times greater between sea-level and 500 metres than between 500 metres and higher levels. In the City of Mexico, elevation 7000 feet (2268 metres), the deaths from tubercular disease in 1892 were about 8 per cent. of the total mortality.

The results of this investigation show that the composition and general character of the blood are altered by residence in high altitudes. The corpuscles increase in number, the urine becomes more dense, less abundant, and has a greater proportion of urea. The number of respirations and pulsations of the heart increase; so do the respiratory capacity and the mobility of the chest-walls. There is also a diminution of the intravascular blood-tension. They account for the augmentation of the number of red blood-corpuscles per cubic millimetre by attributing it to the increased density of the blood due to the extreme dryness of the air. This raises the count to between 6000 and 7000 per cubic millimetre, and thus they corroborate the findings of Solly, who has pursued similar investigations at Colorado Springs, elevation 6000 feet. Studies of this kind are highly appreciated at the present time, when commercial and political interests throughout North America are more closely bound together. G. H.

CHEMISTRY: GENERAL, MEDICAL, AND PHARMACEUTICAL, INCLUDING THE CHEMISTRY OF THE U. S. PHARMACOPŒIA; A MANUAL ON THE SCIENCE OF CHEMISTRY AND ITS APPLICATIONS IN MEDICINE AND PHARMACY. By JOHN ATTFIELD, F.R S. Sixteenth edition. Philadelphia and New York: Lea Brothers & Co., 1899.

THE successive editions of this excellent work have been reviewed in these columns, and the present edition merits the continued praise of the reviewer and laudation of the reading public. Written from the chemical stand-point, this treatise offers a fulness of detailed information upon the chemical aspects of medicine and the collateral sciences, and gives, in fact, as much as any book which is written from the stand-point of the chemist, and not of the physiologist and pathologist. As in all books of this character, the inorganic predominates over the organic chemistry; the sections upon the latter are, however, exceedingly well written. Such a treatise is indispensable to the alert practitioner as a work of reference, to the student as a guide, and to the scholar as a companion. A. E. T.

THE RETROSPECT OF PRACTICAL MEDICINE AND SURGERY. Being a Half-yearly Journal, Containing a Retrospective View of Every Discovery and Practical Improvement in the Medical Sciences. By JAMES BRAITHWAITE, M.D. Lond., assisted by E. F. TREVELYAN, M.D. Lond., B.Sc., M.R.C.P. Vol. CXVIII. January, 1899. Uniform American edition. New York: G. P. Putnam's Sons, 1899.

MEDICAL literature has its parasites, and these are the feeders of parasites of the second degree. The present volume, like its predecessor, belongs to both parasitic groups. How valuable the collection of reprints and abstracts from various sources—good, bad, and indifferent—is likely to prove to the general practitioner we are unable to surmise. Unquestionably, if a man reads no other medical literature he will obtain a great deal of valuable information from Braithwaite's retrospect; but if he desires to keep abreast of medical progress, and to know what is best in the medical thought of the day, we fear that he will be greatly disappointed by the material furnished by the editors. The first half of the book is called the synopsis. It is difficult to understand why it exists at all, for the material could be much more satisfactorily distributed in the second or systematic portion. It consists entirely of abstracts taken from various sources, and usually representing papers that are not of the highest value. There is a certain degree of classification into medicine, surgery, etc., that is well as far as it goes, but under each subheading the articles are arranged alphabetically, which produces a rather incongruous juxtaposition at times. The second part of the book is very much better than the first. Extracts, not abstracts, are given from 130 articles representing the whole domain of medical science. We cannot altogether approve of the selections. Many articles of considerable value have been omitted, and many others of considerably less importance inserted. The editors appear to have been attracted rather by theoretical or statistical material than by actual clinical or pathological facts and observations. German and French literature, to say nothing of that of other countries, has been almost entirely neglected, the few articles included being, as is frequent in the English and American journals, not always the most important. The publishers have done their part creditably. The book is well printed and convenient to hold. The proof-reading, as a whole, is excellent. A few absurd mistakes have, however, been passed (page 33). It would seem reasonable to suppose that in the multiplicity of books of this type the most desirable arrangement would have been discovered, and would survive by a process of natural selection. There are, however, almost as many methods as books, and none seem to be satisfactory. The present book is probably adapted to the wants of a certain number, and although neither perfect nor even the best, is not wholly without good points. J. S.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Tabes Dorsalis.—THOMAS (*Bulletin of the Johns Hopkins Hospital*, April, 1899, p. 51) has analyzed 111 cases of tabes which have been treated in the Johns Hopkins Hospital and Dispensary since its opening in 1889. Of the 111 cases, 106 were white and five negroes. Thus only 4.5 per cent. of the cases were in negroes, although the latter constitute 10.05 per cent. of the new cases treated. This low percentage is remarkable when one considers that of the cases of early syphilis treated in the genito-urinary dispensary during the past two years the number was five and a half times greater in the negro than it was in the white race. This would seem to diminish the importance of syphilis as an etiological factor.

Males were affected much more frequently than females. Ninety-seven cases were in males and fourteen in females. The females were all white.

Most of the cases developed between thirty and fifty. The youngest case was twenty-five and the oldest sixty-six. Fifteen cases developed after fifty years of age.

The history of syphilis was carefully studied. The results were: Certain syphilis, 42.1 per cent.; possible or probable syphilis, 63.1 per cent. "These figures fall below those obtained by many of the later observers, but it is not due to lack of zeal."

Regarding the bearing of syphilis as an etiological factor in this series, Thomas says:

1. In a large proportion of cases of tabes a history of syphilis can be obtained.

2. In a certain and a not inconsiderable number of cases there is no history of a venereal sore or other syphilitic manifestations.

3. In negroes tabes is relatively uncommon, whereas syphilis is much more common in them than in the white population.

4. The partial immunity of women is greater than can be satisfactorily accounted for by the relative infrequency of syphilis among them.

Thomas believes that the study of his series would seem to show that syphilis is an important factor in the etiology of tabes, but that it is far from being so important a factor as many would wish to make. That syphilis is not the only factor seems to be shown.

The Iodine Reaction in Leucocytes.—KAMINER (*Deutsche med. Wochenschrift*, 1899, No. 15) has made a critical study of the iodine reaction in the leucocytes, and opposes the idea usually accepted that the brown color depends on glycogen, as Ehrlich and others claim. Kaminer describes three degrees or stages of the reaction. The first is that of diffuse staining; the protoplasm is reddish, the nucleus unstained. In the second, more or less intensely brown granules and masses can be seen. In the third, rarely seen, the protoplasm is wholly converted into dark brown masses, the nucleus still unstained. Free masses showing the reaction were rarely seen, but the author does not agree with Czerny that they are artefarcts. In normal individuals the author never observed the reaction. In disease there was no definite relation between the occurrence of the reaction and the pathological process. In puerperal fever, with or without suppuration, it was always present, but in other diseases, febrile and inflammatory, it was sometimes present and sometimes absent. When present the reaction varied in intensity without regard to the other clinical features. It was never present without leucocytosis. In sepsis all stages were present. In pneumonia it was usually present, but never in the third degree. In phthisis it was present at times, but only in the first degree, and in rheumatism it was never obtained. Leucocytosis was sometimes observed without the reaction, and the latter was present in cases without localized suppuration. Of special interest are the results of the test in diabetes. In four cases there was never a trace of reaction. In these there were no leucocytosis. In the fifth case, examined in coma, with acetonuria and leucocytosis, the reaction was present in the second degree, with extracellular granules. Unlike Czerny, the author never obtained the reaction in anæmic and cachectic patients, but in many cases of cancer with necrosis or other complications he had positive results. In a case of hemorrhagic diathesis with leucocytosis the reaction was obtained. Agents that increase the leucocytes in the blood, such as spermin, did not affect the reaction, nor did aseptic fever cause it. Toxic substances, on the other hand, in rabbits, seemed to increase the iodine reaction of the leucocytes. The author concludes that the substance giving the reaction is a product of degeneration formed in the leucocytes and not taken up from other organs.

Recklinghausen's Disease, with Sarcomatous Growth Involving the Brachial Plexus.—ROLLESTON enumerates the cardinal signs of the morbid entity, described first by VON RECKLINGHAUSEN as being: 1. Tumors of the skin of the nature of molluscum fibrosum. 2. Subcutaneous tumors situated on the nerves plexiform or fibroneuromata; these are multiple and usually small-sized, and may be on peripheral nerves, on larger nerve-trunks, near the nerve-roots, on the cranial and sympathetic nerves. 3. Pigmentation of the skin, either patches of considerable size or small specks resembling freckles. In addition there may occur pain, arthralgia, alteration of sensation, and impaired mental activity. The term generalized neurofibromatosis has been applied to the disease.

Rolleston reports a case of a man, aged thirty-two years, having a large patch of molluscum fibrosum on the left shoulder from birth. The skin of the body was generally brownish, but there were irregular areas of pigmentation, some as large as a shilling, the majority, however, resembling freckles. Under the skin of the left back were a number of small, firm, readily movable tumors appearing to be multiple neurofibromata; there were a few similar nodules under the skin of the right side of the abdomen; no diarrhœa was present.

The further interest in the case was the development of a large tumor on the left side of the vertebral column at the base of the first dorsal vertebra, giving rise to such pressure symptoms as contraction of the left pupil, ptosis, increased pulse-rate, ulnar nerve paralysis, and, later, dyspnœa, stridor, and brassy cough. An exploratory operation revealed too extensive a tumor to allow removal; pieces removed for examination showed it to be spindle-celled sarcoma.

At autopsy a very extensive growth could be made out involving the inner cords of the brachial plexus; the tumor had spread into the thorax and had occupied the superior mediastinum on the left side. Surrounding structures, the internal jugular vein, trachea, left bronchus, and thoracic duct were compressed, and, in the case of the vein, obliterated; the cervical sympathetic was extensively destroyed.

Rolleston suggests that the tumor had its origin in a neurofibroma, becoming subsequently a malignant neuroma.

The nodules under the skin of the back and abdomen were fibroneuromata, with some myxomatous tissue; neuromata were present in the abdominal sympathetic.

Various theories have been put forth in explanation of von Recklinghausen's disease. FEINDEL suggests that it is the outcome of a congenital malformation of the ectoderm, and is supported by OPPENHEIM. To Rolleston it seems more probable that a developmental rise on the part of the mesoblast in the corium and nerves is responsible, this accounting for the fibroneuromata and the molluscous growth, while the pigmentation of the skin is allied to the common pigmented moles that occasionally develop in malignant melanotic growths. Rolleston mentions, further, the fact that GOLDMAN and BOWLBY describe sarcomatous changes in neuromata.—*Lancet*, July 29, 1899.

The Excretion of Pepsin in Achylia Gastrica; the Estimation of Pepsin in the Urine.—TROLLER (*Archiv f. Verdauungs-Krankheiten*, Band v. Heft 2) records two cases that would usually be classed under the head of achylia gastrica, since free hydrochloric acid was entirely absent in both cases for a considerable period. One patient in especial had had digestive disturbance for nine years, had very low total acidity and complete lack of free hydrochloric acid, while the gastric contents showed after rough testing no power of digesting albumin. Troller made more accurate investigations concerning the presence of pepsin, however, and found that by a modification of Hammerschlag's method he could determine that the gastric contents did digest albumin in both cases. From these results he says, with somewhat rash decision, that achylia gastrica is a misnomer for most of these cases, and that the term hypochylia should be used instead, since, though hydrochloric acid is absent, ferments will be found if the examination for them is sufficiently careful. His report concerning the presence of pepsin in the urine is of greater interest. He modified Hammerschlag's method for the quantitative determination of pepsin by using protargon instead of fibrin in making up the solution used as a test of the digestive power, choosing protargon because it dissolves much more completely in a hydrochloric acid solution, and greater accuracy of results is, therefore, possible. He then investigated normal urine, and found in all instances small quantities of a substance that digested albumin in an acid medium, and which he, therefore, believed to be pepsin. Then cases of gastric disease were investigated, and it was found that the quantity of pepsin in the urine varied directly with the condition of the stomach contents. Hence, he decides that if the use of the stomach-tube is contraindicated the quantitative determination of the pepsin in the urine will give a direct indication of the secretory power of the gastric glands. The proteolytic action of bacteria is believed to have been entirely excluded by the fact that all of the solutions of protargon used as tests contained free hydrochloric acid. (The number of cases reported is small, however, the method is subject to serious error, and the results are at present merely interesting, not conclusive.)

The Excretion of Uric Acid during an Acute Attack of Gout.—BADT (*Zeitsch. f. klin. Med.*, Band xxxvii. Heft 5 and 6) delivers another blow at the old and generally accepted teaching concerning the relation between uric acid excretion and gout. He reports the results of estimations of uric acid in five cases of gout, four estimations being made in each case, three of them during the acute attack, and the fourth some weeks later, in order to comparo the conditions at the two periods. In no instance was the excretion found lessened during the attack; indeed, it was usually greater than in the interval, though the increase was so slight as to be negligible. This is, of course, directly opposed to the old teaching that there is uric acid retention in the early part of the attack, and free excretion as the paroxysm passes off; and the work is confirmatory of that done by other recent workers who have used accurate methods. Taylor's work (THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, August, 1899) has shown very convincingly that in a healthy man the excretion of all the purin bodies is almost exactly parallel to the quantity contained in the food, a fact which has been generally overlooked in considering the amount excreted in attacks of gout. This is a matter of especial importance, as but small quantities of food are taken, as a rule, in the early part of the attacks, and as the intensity of the suffering and depression becomes less the patients take relatively larger amounts of food.

The Influence of Nutrient Enemata on the Gastric Secretions.—ZIARKO (*Wiener klin. Wochenschrift*, 1899, No. 18) publishes some investigations on this subject. The statements of previous observers have been contradictory; exact examinations were lacking, and some have gone so far as to assert even that rectal feeding is not useful in the treatment of gastric ulcer, because it stimulates the flow of hydrochloric acid. The author examined the stomach contents before and after giving nutrient enemata in ten persons with various diseases. The result was that within two and one-half hours after the injection there was no increase in the amount or acidity of the gastric contents. In fact, the acidity was reduced, due, the author thinks, to the secretion of mucous.

A New Focus of Ankylostoma and Its Peculiarity.—ZINN and JACOBY in their work upon the geographical distribution of ankylostoma duodenale omit a focus of the disease located on the island of Madeira. The attention of Dr. J. Goldschmidt was first directed to this new focus by a landowner of Porta da Cruz, Northern Madeira. His tenants and workmen were attacked by a peculiar disease known among the people as "ictericia," *i. e.*, jaundice, which had been introduced by a returned islander who had been absent in Brazil for many years. During the first five years there were five fatal cases. The diagnosis of ankylostomiasis was made by Dr. Vincent Machado, and confirmed by Prof. Leichtenstern. The cases were all among the poorest class of peasants and among those crowded into dirty huts; entire families were often infected. Without exception people living under favorable circumstances remained free from the disease. Fatal cases, which were not so rare at first, have not occured during the past four years. Across the mountains to the south, in the village of San Martinho, there was another focus, and these seem to be the only ones on the island. Tænia, oxyuria, and ascaris are very common in all parts of Madeira.

The author draws the following conclusions: Ankylostoma is carried through great distances by infected persons. The possibility of infection depends upon the close contact of healthy with infected men. For the existence of an ankylostoma epidemic it is necessary that many poorly nourished men ingest these worms without having their growth in the bowel disturbed by too many other parasites. In weak individuals a few worms will produce the symptoms of ankylostomiasis, while in the more robust it requires a large number. By administering anthelmintics, such as thymol and felix mass, an epidemic can be stopped.—*Deutsche med. Wochenschrift*, No. 14, 1899.

The Blood in Hysteria and Neuroses.—LUXENBURG (*Centralblatt f. Inn. Med.*, 1899, No. 21) reports a series of examinations in forty cases. The examinations included counts of the corpuscles and estimations of hæmoglobin, fibrin, water, and total solids. The results showed: 1. That in contradiction to the usual view, and notwithstanding the anæmic appearance so frequent in patients with functional neuroses, there was in these cases no hydræmia. 2. The red blood-corpuscles were often considerably increased, considered by the author to be the result of vasomotor disturbance at the time of the examination. 3. The leucocytes were often subnormal. 4. The fibrin often showed marked changes.

Acute Graves' Disease.—HIRSCHLAFF (*Zeitschrift f. klin. Med.*, 1899, Band xxxvi. p. 200) reports a case of great interest. The patient was a woman, aged twenty-one years, who for nine years had had attacks of palpitation of the heart and dyspnœa at the time of menstruation. In 1895, after a fright, she had convulsions and became unconscious, and similar attacks occurred every month, preceded by paræsthesia of the hands and feet. Excitement and anger frequently brought on the attacks. Three weeks before admission to the hospital the patient's skin became dark, she grew weak, had constant headache, and complained especially of palpitation of the heart. The eyes became prominent. The appetite was increased, but there was steady and marked loss of weight. In addition to the symptoms mentioned, the patient complained of weakness, with giving way of the legs, and excessive night-sweats. On admission there was general pigmentation of the skin, most marked on the extensor surfaces, the axillæ and groins, areolæ, and external genitals. The perspiration was excessive. Exophthalmos was marked, with Graafe's, Stellwag's, and Mœbius' symptoms. There was great restlessness, almost amounting to choreic movements, and a fine tremor of the hands. The patient was very excitable. The thyroid was slightly enlarged. The heart was enlarged, the sounds pure; pulse 100. The urine and blood were negative. While under observation the patient gained in weight, the pigmentation became paler, menstruation reappeared. A number of hysterical attacks occurred, following trifling annoyances. The temperature grew irregular, the stools became diarrhœal, and after a sudden and unexplained rise of temperature, with frequent pulse and respiration, the patient died. Autopsy showed adenoma of the thyroid, hyperplasia of the thymus, tonsils, spleen, and of the adenoid tissue in the stomach and intestines, and hypertrophy and dilatation of the heart. As infection could be excluded (?), the author looks on the changes in the lymphatic tissue as due to an intoxication, the same that caused the fever and the sudden death.

During life the metabolic processes were carefully studied, the period of observation—forty-six days—being the longest so far reported in this disease. The results are given in detail. The medication, including thymus and thyroid tablets, had no effect on the disease or the metabolism, but was used for so short a time that no definite conclusions can be drawn, especially in regard to the harmlessness of the thyroid extract. The emaciation was overcome by overfeeding, but aside from a few symptoms this had no effect on the disease as a whole.

Pneumonia with Peculiar Course.—PYCHLAU (*St. Petersburger med. Wochenschrift*, 1898, No. 52) reports the following case. Fourteen days after a severe attack of angina, the patient, a child, developed a temperature of 39.5° C., pulse of 160; the breathing was weak and rapid; there were vomiting and marked apathy. On examination of the chest distinct bronchial breathing was detected in the right lower lobe. During the night there was profuse sweating, followed by profound sleep and a fall of temperature to 36.6° in the morning. The breathing was quiet, the pulse regular, 84; there was neither cough nor bronchial breathing, but at midnight the temperature rose to 41.1°; the pulse was 130 to 140 and the breathing 50 per minute. Over the section of the lung first affected the murmur was purely vesicular, while in the right upper lobe there was indistinct bronchial breathing, with a somewhat tympanitic note on percussion. On the following morning the temperature was 36.6°; there was complete euphoria, with no signs in the lungs. In the evening the temperature again went up, reaching 41°. From this time there was distinct infiltration of the left lower lobe, with characteristic signs. Ten days after the infiltration of the left lower lobe was first demonstrated the temperature was for the first time under 37° C. It rose the next day, however. On the nineteenth day of the disease and the seventh day of the second period of fever crisis occurred, the temperature falling to 36° C. The author believes that this case was a mixed infection, a part of the symptoms being caused by Fraenkel's diplococcus and others by the streptococcus. He is in doubt as to whether this was a case of croupous pneumonia, with delayed and somewhat unusual course and very tardy crisis, or a recurring pneumonia in which the first crisis occurred at the beginning of the twelfth day of the disease, and after only twenty-four hours' intermission the recurrence began. He also considers the possibility of a wandering pneumonia. The author thinks the pneumonia was secondary to the angina, the infective agents being streptococci and diplococci harbored in the tonsils. The child had not been out of the house for weeks, and there had been no pneumonia in the house for a year at least.

SURGERY.

UNDER THE CHARGE OF

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The Technique of Craniotomy; A New Conductor for the Wire Saw.—PODREZ (*Centralblatt für Chirurgie*, 1899, No. 9), realizing the advantages of craniotomy when performed by the osteocutaneous flap method, with the use of the wire saw, has devised an instrument for passing it rapidly from one opening in the skull to another, and afterward protecting the brain and its membranes from injury while the bone is being divided.

The instrument is made from a watch-spring, 3 to 4 millimetres broad and 13 to 15 millimetres long. At one end is a ring or handle, at the other a rounded tip perforated with an eye, to receive the silk ligature that is connected to the saw, and is double the length of the conductor. The ligature is attached to the saw, then threaded to the middle in the eye of the conductor. Two openings are made at the ends of the line of incision, in a slanting direction, in which the saw is to be passed. The director is then passed, armed with its thread, and is made to emerge at the second opening. The thread is removed from the eye and the saw drawn through. The guide, on account of the recoil of the spring, presses the membranes of the brain and the brain itself inward, and prevents injury by the saw. Three sides of the square to be removed are cut in this manner. In the fourth only the inner table is cut, while the outer is broken, preserving the periosteum and skin pedicle.

On Nephralgia.—HUBBARD (*Annals of Surgery*, August, 1899) reports five cases in which no assignable cause could be found for the pain and with symptoms that were so severe as to simulate calculous disease. While holding that nephralgia is a term expressive of a symptom rather than a disease, he believes that there are a certain number of cases which must be classed under this term where pain is the most marked symptom.

All of the cases reported were operated upon, and in all but one a nephrotomy was done and the kidney searched for stone, without any being found. Four cases recovered from the pain and other symptoms, as hæmaturia and pyuria. The one that was not relieved had had the kidney incised, but no stone was found.

The symptoms are so often those of stone in the kidney that the differential diagnosis is difficult and rarely made. Age and sex are no help. Stone is found in the right or left kidney in relatively the same proportion of cases. Involvement of the testicle by the pain is a little more frequent in nephralgia. The urine gives the greatest help; it is free from blood, pus, and crystals in a great majority of cases, though it may be free in calculous disease. The urine may also be normal in those cases where the flow is stopped, at least temporarily, from the diseased kidney by the impaction of a stone in the ureter. However, in most cases where the symptoms are sufficiently persistent and severe to warrant the diagnosis of stone the urine will be found to be abnormal. With regard to distinguishing the urine of pyelitis from that of cystitis, it is said that the reaction in the former is usually acid while in the latter alkaline. Cystoscopy may be of aid in determining which kidney is diseased. The diagnosis from tuberculous kidney may at times be difficult.

Operation is usually started with the idea that a stone is present. To be thorough, the examination for calculus must be made with a probe as well as by the finger. If nephrotomy is not effectual, palpation and needling are of uncertain value. The ureter should be probed for calculi. If nothing abnormal can be found the capsule should be split from pole to pole and the kidney fixed in place by sutures before closing the wound. The prognosis, though not always favorable as to cure, is certainly, in the light of present experience, much better than formerly, and if any mobility has been detected and rectified relief may be hoped for.

The Treatment of Injuries of the Spinal Cord.—BOLTON (*Annals of Surgery*, August, 1899) makes the following summary of his method of treatment:

Extradural hemorrhage does not give rise to cord lesions or symptoms, and requires no treatment.

2. Total lesions of the cord are irremediable, because the cells and fibres of the entire cord are destroyed, are never regenerated, and are replaced by cicatricial tissue. The lesion thus is permanent, and requires no treatment.

3. In hæmatomyelia the clot is absorbed; its site persists as a cavity or is filled by newly-formed tissue; irregularities of circulation in the surrounding portions of the cord adjust themselves. There may be great amelioration of the symptoms. There is, therefore, no therapeutic indication, and no remedial treatment is possible.

4. In partial contusion of the cord the lesion results in permanent destruction of cells and fibres; disturbances of circulation adjust themselves. Repair is accomplished by cicatricial tissue. No treatment is available.

5. In open injuries of the cord there are destruction of cells and fibres and disturbances of circulation. In addition, infection may occur or a foreign body be introduced and left in or lodged against the cord, and by its continued presence produces great disturbance of circulation and consequent extensive degeneration and necrosis of cells and fibres. Repair occurs by cicatricial tissue. Here immediate operation is indicated for antisepsis, drainage, and the removal of the foreign body.

Observations on the Sterilization of Catgut—DARLING (*Journal of the Boston Society of Medical Sciences*, May, 1899) has shown by a series of experiments that it is possible and practicable to sterilize catgut by dry heat and yet maintain the tensile strength of the gut. When baked in the ordinary way it becomes shrivelled and brittle if the temperature is high enough to sterilize it. This may be effectually prevented by wrapping the separate strands in several layers of paraffin paper. This simple procedure prevents the driving out of the moisture and fat in the catgut, so that it remains unshrivelled and flexible after a prolonged exposure to dry heat. This use of paraffin paper is not new; it was first employed by Broeckmann. The sterilization should be for three hours at a temperature of 140° C. None of the twenty lots of gut thus treated was found to contain bacteria His observations lead him to the following conclusions:

1. Catgut can be sterilized by dry heat with but slight loss of tensile strength.
2. Dry paraform gas is of doubtful value for the sterilization of catgut.
3. Methods of sterilization which involve soaking in antiseptic solutions tend to weaken the catgut to a greater or less degree.

Suturing and Wounds of the Heart.—WEHR (*Centralblatt für Chirurgie*, July 8, 1899) was led by the recent advances made in the surgery of heart wounds to study experimentally on animals the technique of such operations. His studies lead him to the following conclusions:

1. The heart must be reached through a large wound if the operation is to be successful on a wounded and bleeding heart. He found it very difficult to operate unless there was given sufficient room; the sutures could not be placed with ease otherwise or with the rapidity that the urgency of the case demands.
2. Some method is essential by which the heart can be freely exposed and the wound enlarged in any needed direction.
3. Compression of the heart to make the operation bloodless is dangerous. He found that in the dog it produced death, and believes it should be strenuously avoided in the human being.

The author proposes the following method for operations on the heart:

An incision commences on the right border of the sternum, just above the fourth rib, and passes transversely across to above the cartilage of the fourth rib on the left side. The incision is then curved across the fourth, fifth, and sixth costal cartilages, and sweeps inward transversely through the seventh, resecting the xiphoid at its base. The costal cartilages are to be resected in an inclined direction, so that the plane of the incision intersects the cartilage nearer to the sternum internally than it does externally. After the cartilages have been resected and the sternum has been sawed through without injury to the mediastinal periosteum the whole skin muscle and bone flap are turned back gradually, while the costal pleura is carefully dissected free from it. When this is accomplished the flap is turned clear back, breaking the costal cartilages on the right side. In resecting the ribs a button-pointed bistoury should be used, to avoid injury to the internal mammary artery.

Excision of Carcinoma of the Sigmoid Flexure.—BARLING (*Birmingham Medical Review*, March, 1899) reports two cases of carcinoma of the sigmoid which came to him sufficiently early in the course of the disease to justify an attempt at excision. Three other cases suffered from the disease in the same location, but local and general conditions absolutely forbade any attempt at excision.

In neither case was any attempt made at the time to restore the continuity of the bowel. It was undesirable in the first case, owing to the adhesion of the growth to the parietes and the rather extensive manipulation called for in the excision. He, therefore, employed Paul's method. In the second case the patient was in the middle of an acute attack of obstruction and six months pregnant. The complete operation, with restoration of the bowel, is the more brilliant operation; but the author sought the rapid recovery of his patients, and in consequence did the shorter operation. The situation of the growths made the condition of the patient after operation the same as in left inguinal colotomy. The results were satisfactory in these two cases, the pregnant woman recovering and giving birth to a healthy child at term.

They were, however, disappointing, in that recurrence took place at the end of twelve months, though the conditions at the time of operation were apparently very good. The cases were not seen sufficiently early to render the chances favorable.

The Surgical Sequelæ of Influenza.—FRANKE (*Archiv f. klin. Chirurgie*, 1899, Band lix. Heft 1 and 3) finds that the involvement of bones is not an infrequent sequela of influenza. The manifestations are very similar to those seen after typhoid fever. They are chiefly osteoperiostitic in form, with fewer cases of osteomyelitis. This is the great difference from most forms of infectious bone disease, as the majority of them are forms of osteomyelitis. Suppuration takes place in a very small proportion of cases. In his own cases necrosis never took place, or at least not to the formation of sequestra. In some cases there was no suppuration, but the bone was softened. As an illustration, he mentions a case in which softening followed a traumatism in a patient who had had a severe attack of influenza.

The causation of all these bone diseases is possibly not proved, but it is certain that the influenza bacillus or the toxins it produces are responsible for some of them. This infection is less severe than that produced by the staphylococcus or streptococcus, and is more prolonged in its development. The bacillus can apparently remain dormant for a considerable period before manifesting its presence in these sequelæ.

Operation for Perforation in a Case of Typhoid Fever.—MARTIN (*University Medical Magazine*, June, 1899), in reporting a case in which he operated for perforation, but in which the patient died sixteen hours after operation, says of these cases that the operation will become more frequent, but that the mistakes in diagnosis and operations where perforation has not taken place will tend to give a set-back to the legitimate operation. There are certainly cases in which the differential diagnosis is extremely difficult. In intestinal paresis there is liable to be an absence of pain or fixed tenderness, and of the hardness of the abdomen which is a common accompaniment in peritoneal inflammation. Moreover, shock and a falling temperature are not characteristic of this condition. When, however, a patient in the second or third week of typhoid fever complains of a sharp, sudden, persistent, agonizing pain; of a great increase of tenderness; when this is accompanied by symptoms of marked constitutional depression, and is followed by rapid and life-threatening tympany, if there is the slightest prospect of his surviving operation the abdomen should be opened at once.

Deformity and Loss of Function Following Colles' Fracture that Involved the Radial Epiphysis, Retarding its Growth, while the Ulna Continued to Grow.—MARCHANT (*Rev. d'Orthopedie*, July, 1899) reports the case of a youth, aged eighteen years, who had fallen from a tree at the age of nine, fracturing both wrists. They had been set, and united well, with no loss of function. For some time previous to presenting himself the patient had noted an increasing functional loss, and finally observed a marked deformity of the left wrist, which brought him to the hospital. The examination showed a prominence of the ulna that was very marked. A skiagraph demonstrated the correctness of the opinion that there had been an interference with the development of the radius, due to the fracture which had involved the epiphysis, while the radius had continued to grow. A resection of the ulna corrected the deformity, and as a result perfect function was secured in the joints.

The Arterial System of the Kidney and its Relation to its Pathology and Surgery.—ZONDEK (*Archiv f. klin. Chirurgie*, 1899, Band lix. Heft 3) has made a careful study of the arteries of the kidney and their distribution by means of corrosive preparations, both in normal and anomalous cases. From these studies he derives the following conclusions that have a direct bearing on the surgery and pathology of the kidney:

1. The fact that one pole of the kidney frequently receives its arterial supply from a distinct branch of the renal artery would seem to account for tubercular infection of the kidney often being unipolar.

2. The origin of the capsular arteries is from the renal arteries within the parenchyma. This explains the frequent combination of paranephritis in the foci located in the substance of the kidney. The virus that should pass out through the kidney can enter the kidney and the capsule as well. Thus in paranephritis when the kidney is exposed disease is frequently found in its substance which was the original pus and yet had produced no clinical symptoms, or the reverse may be true.

3. The course of the capsular arteries dividing between the anterior and posterior surfaces and the superior and inferior poles of the kidney explain the division of paranephritic abscesses and processes into four groups, as pointed out by Tuffier.

4. The fact that occasionally we find a second anomalous main branch of the renal artery outside of the hilum, which is distributed directly to one or the other pole, accounts for the fact that occasionally during nephrectomies hemorrhage persists after the arterial pedicle has been ligated.

5. The relations of the different branches of the renal artery to the different portions of the kidney explain the mode of infection which produces localized metastatic abscesses.

6. The resection of the kidney is possible, as has been shown by various operators, and is indicated under certain conditions, as the function of the kidney can be maintained in the remaining portions. The distribution of the arteries indicates the lines of incision if the functional activity of the kidney is to be maintained at its best. The diseased foci should be removed in wedge-shaped sections, having the base on the periphery, with the lines of incision made in reference to the arterial distribution.

7. In nephrotomies the median incision should not be employed, but the arterial distribution should be taken into account. The section should be made in the middle third of the lateral aspect, parallel to but one-half to three-quarters of a centimetre from the middle line on the dorsal aspect of the kidney. It should penetrate somewhat obliquely into the pelvis. This incision avoids the larger arteries, and is less liable to provoke serious hemorrhage.

The Resection of the Vertebral Arches in Cases of Paresis due to Spondylitis.—Trendelenburg (*Archiv f. klin. Chirurgie*, 1899, Band lix. Heft 3) derives the following conclusions from his observations:

1. In pressure-palsies due to spondylitis the pressure upon the spinal cord is exerted either by an abscess or caseous focus in the spinal canal, by pachymeningitic granulations and fungous growths, or by the narrowing of the canal as the result of the angular deformity. The latter is far more frequent than has been formerly supposed.

2. The resection of the vertebral arches in selected cases has a more favorable prognosis than was known previously. It is especially indicated in cases that are nearly or completely cured of their tendency to angulation, while in acute cases the prognosis is bad, and operation may make the condition worse.

3. Complete paralysis does not preclude benefit. Even in cases that have existed seventeen years there may be and has been relief.

4. The result of the operation, as in other cases of nerve operation for pressure-palsies in the extremities or neuroplasties, can be delayed for a con-

siderable time. It is generally a year or six months before the paresis has completely disappeared.

The Operative Treatment of Epilepsy.—SCHAR (*Archiv f. klin. Chirurgie*, 1899, Band lix. Heft 3) comes to the following conclusions as the result of his study of the literature of this subject and his observation of the cases occurring in Koch's clinic:

Operation is to be undertaken in cases of epilepsy whenever internal dietetic treatment has failed to produce results in a short time. The slight mortality from such operations makes the danger inconsiderable. It is better to operate too often than too seldom. The surgeon who treats a case of traumatic epilepsy by internal medication for a long period, and only resorts to operation when he finds he cannot produce a cure by other means, does not do the best for the patient. Epileptic patients should be examined by the surgeon as well as the physician at an early period. It is best for them to make the examination together. In asylums the surgeon should from time to time examine the cases and determine which require immediate operation.

The surgeon should not forget, however, that internal medication and dietetic treatment are of great value, and that without them, even after operation, the patient could not recover. Alcohol must be avoided and special care given to the diet of children who have suffered from traumatism. Epilepsy due to traumatism can be greatly benefited by operation at the site of the trauma.

The Treatment of Compound and Complicated Fractures of the Leg.—CHANDOYE (*Rev. d'Orthopedie*, July, 1899) arrives at the following conclusions regarding the method of treatment employed by Poucet:

1. The treatment of fractures of the leg situated in its diaphysis and compound in character varies with the severity of the injury.

2. In the less grave cases, where there is a small wound but no bone protruding, after strict antiseptic precautions have been employed, the limb can be placed in proper position an ordinary fixation applied, together with an antiseptic dressing.

3. In the next group of cases, where the bone protrudes from a wound of greater or less extent, the result of a severe traumatism, recourse should be had immediately to resection, with careful antisepsis. This operation should be done immediately, before general infection has taken place. No more should be removed than is absolutely essential. The wound should not be enlarged or more dissection done than is absolutely necessary. It should, however, be sufficient to permit perfect antisepsis and the reduction of the fragments into position.

4. Should the case be seen later, after the infection has become more general, excision reduction, with rigorous antisepsis, is still the best procedure.

5. Amputation should be avoided in the great majority of cases, and only employed where the bloodvessels or nerves have been so injured that the vitality and functional value of the limb cannot be depended upon. Secondary amputation is to be employed only when a persistent infection and the weakened condition of the patient make it absolutely necessary.

6. The remote results of resection, so far as the functional ability of the limb is concerned, are excellent. The author has collected fifteen cases, which were seen at periods varying from five to twelve years after the accident. They all employed their limbs equally with the sound one, and walked long distances without any ill effects. In some cases even as much as twelve centimetres were resected without any apparent influence on function.

PEDIATRICS.

UNDER THE CHARGE OF

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AND

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Blennorrhagic Peritonitis in Female Children.—ROUSSEAU, in his recent thesis (*Péritonite Blennorrhagique chez la Petite Fille*, Thèse de Bordeaux, 1899), discusses this most serious though rare complication of specific vulvo-vaginitis in children. Clinically, it may appear as a generalized or localized acute peritonitis of grave or benign form, or may assume a chronic type.

In the acute forms the principal symptoms are abdominal pain, spontaneous or elicited by pressure, meteorism, vomiting. The temperature is elevated, the pulse small and frequent, the countenance pinched. In the benign form the symptoms are often obscure, being those of peritonism rather than true peritonitis. The chronic variety usually gives few symptoms, and is apt to be overlooked by both patient and caretakers.

In all cases of unexplained peritonitis in girls it is important to look for a vulvo-vaginitis. The discovery of the gonococcus in the peritoneal exudate, while inconstant, is a definitive diagnostic sign.

The prognosis is grave in some of the generalized cases, but recovery may occur with obliteration of the tubes and permanent sterility.

In the treatment prophylaxis is most important. No case of vulvo-vaginitis should be considered too trivial to demand careful treatment.

If the disease seems benign medical treatment may be sufficient (leeching, laudanum cataplasms, ice poultices, opium, restriction of diet, etc.). Should the pulse become frequent, operation should at once be made by a median incision. The earlier the intervention the greater will be the chance of success.

Cerebral Complications of Pertussis.—Reference is made to a case recently reported by E. SCHREIBER (*Archiv f. Kinderheilkunde*, 1899, Band xxvi. S. 1) for the purpose of calling attention anew to the very serious cerebral complications of whooping-cough. The patient was a girl, aged two years, who, during a paroxysm of cough, presented generalized convulsions. These recurred on the following day, and two days later were repeated, after which it was found that the child presented a paralysis of all the members, with aphasia, paresis of the pupils, right facial palsy, and relaxation of the sphincters. The temperature rose to 103° and remained elevated for two days.

Meningitis was at first diagnosticated, but the subsequent course of the case disproved this, the convulsions ceasing after twelve days, and speech and power beginning to return eight days later. The author attributes the disturbance to a meningeal hemorrhage, and concludes from a study of the literature that cerebral disturbances occurring in the course of pertussis are most often due to meningeal hemorrhage.

[In this connection attention may be called to a comprehensive study of the paralyses of whooping-cough, published last year by LEROUX (*Journal de Clinique et de Thérapeutique Infantiles*, 1898, Nos. 13 and 17), an abstract of which was made in this department of THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, April, 1899.]

Varicella Aggravated by Dermal Irritation.—P. DESOIL (*Écho Médical du Nord*, 1899, No. 17, p. 193) calls attention to the fact that the eruption of varicella may become aggravated not only by confluence of its vesicles, but also by modification of the primary lesion, which can become spontaneously pustular. In these cases the vesicle, instead of drying and becoming a crust on the third day, becomes umbilicated and is transformed to a pustule which undergoes suppuration. The temperature again rises to 102°, 103°, or 104°, and remains elevated during the whole duration of suppuration; then, if there be no other complications, the suppuration subsides about the eighth day, the temperature falls, the pustules desiccate, and finally leave indelible, white cicatrices. In brief, the disease follows the course of variola.

The author has observed two cases of this kind. The first was that of a girl, aged three years, who, on account of a bronchitis, had had the chest painted with tincture of iodine two days before the eruption appeared. The area of the back irritated by the iodine became covered with a confluent eruption, while the rest of the body showed only discrete lesions. All the vesicles upon the irritated region, without exception, became pustular and healed slowly, leaving varioliform cicatrices, while only a few upon other portions of the body followed this course.

The second case, observed during an epidemic of varicella, was in a somewhat delicate boy, aged two-and-one-half years, who had had some evidences of lymphatism. He presented the usual prodromal symptoms of varicella. The parents, fearing convulsions, put the child for ten minutes in a strong mustard bath. This energetic revulsion of the skin produced an immediate effect upon the eruption, which, from being discrete in the evening, became very confluent on the following day. Five to six hundred vesicles and bullæ of all dimensions were counted. Most of these vesicles developed into pustules and suppurated. Only a small number dried and crusted without going further. During all the period of suppuration the temperature was high and the general state bad. Finally, after local accidents (dermic and glandular abscesses) and bronchopneumonic foci, the child recovered after an illness of six weeks, with numerous varioliform cicatrices upon the trunk and limbs, and some upon the face.

The accuracy of diagnosis was confirmed by the fact that eight months previously the child had been satisfactorily vaccinated and that at the time there was no epidemic of variola or varioloid.

An Epidemic of Infectious Catarrh due to the Pneumococcus.—M. STOOSS (XXXI^{e} *Bericht des Jenner'schen Kinderspital in Bern*, 1898) observed during the winter of 1898, in Bern, a limited epidemic of a grippe-like disease, which, according to his studies, seemed to show the absence of the influenza bacillus. The affection began suddenly, without appreciable prodromal period, by elevation of temperature and catarrhal inflammation of the mucous membranes. This almost always localized itself in the pharynx, giving rise to an intense redness of the tonsils, pillars, uvula, and pharyngeal walls. In no case was there any formation of false membrane.

Ordinarily there was an accompanying catarrh of the mucosa of the nares, conjunctivæ, larynx, and larger bronchi. The frequency of pain in the ears showed that rarely did the Eustachian tube escape, but in no case did a true median otitis supervene. Several times there was catarrhal stomatitis and labial herpes.

Systemic disturbance was shown in all these cases by insomnia, agitation, and high fever (102°–104° F.) of remittent type. As complications, descending bronchitis or bronchopneumonia was observed. The duration of the affection, when uncomplicated, was six to seven days. All the children were under seven years of age.

Examination of the pharyngeal secretions invariably showed innumerable pneumococci, beside occasional staphylococci and streptococci. In none of the cases was the bacillus of influenza found.

Thrombosis of the Superior Longitudinal Sinus.—HAUSHALTER (*Revue Mensuelle des Maladies de l'Enfance*, August, 1899, p. 373) reported to the Société de Médecine de Nancy, at its session, April 12, 1899, the notes of an interesting case in which this lesion was found at autopsy in an infant, aged ten months. At the age of four months it had suffered from a severe attack of gastro-enteritis. From that time till its death it had presented at intervals peculiar phenomena, characterized by crises of convulsive respiration, short cries, cyanosis, and convulsive movements of the eyeballs. These attacks lasted two to three hours and occurred several times daily. During a paroxysm the child became cyanosed to an extreme degree; it died during an attack six days after coming under observation in the hospital.

At the autopsy the only lesion found was a thrombosis of the superior longitudinal sinus, with minute thrombi disseminated in the veins of the pia mater, and intense congestion of the meninges.

The interest of the observation lies in the peculiarity and the long duration of the convulsive attacks, caused by the very slowly progressive character of the thrombotic lesion.

THERAPEUTICS.

UNDER THE CHARGE OF

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Dilatation of the Stomach; Etiology and Treatment.—DR. J. A. LICHTY discusses treatment under four heads:

1. *Hygienic.* All forms of corsets and corset-waists are condemned. Clothing is not to be suspended from the hips. Union undersuits are recommended, and a waist so constructed that when skirts are buttoned to it the weight falls on the shoulders and not on the hips. To accomplish this there are three essentials: (*a*) The material for the waist must be so cut that the pull of the skirts is in the direction of the weave of the goods; (*b*) exact fit, allowing for respiration; (*c*) buttons for skirts must be high enough to prevent pulling below the line of smallest circumference of patient's waist.

2. *Dietetic.* A rather unusual regimen is advocated—namely, two glasses of milk, with two raw eggs, at 8 A.M., 1 P.M., and 6 P.M., and two glasses of milk at 11 A.M., 4 P.M., and 9 P.M. After these meals the patient lies flat on the back or on the right side for thirty minutes; the weight of the food is thus supported by the posterior wall of the stomach instead of the greater curvature. The kidneys become active, bowels become more regular, and there is gain in weight. When the normal weight is regained a solid meal is permitted at 1 P.M., consisting of a mutton chop and zwiebach, with about four ounces of water. For the 4 o'clock feeding are substituted about twelve ounces of water. Gradual return to solid food is made. It is best to intermit the feedings of milk and raw eggs for twelve hours every ten days. During this time water is given in equal proportions in *lieu* of the milk. Foods causing fermentation must be avoided, and among these are potatoes, rice, and white bread. Raw fruits and excess of sweets and fats must also be excluded.

3. *Physical.* Abdominal massage. Exercises to develop the abdominal muscles, electricity, alternate hot and cold packs, or douches applied to the abdomen. The intragastric electrode is mentioned, but percutaneous electric stimulation is considered equally efficacious.

4. *Therapeutic.* Tincture of nux vomica (or strychnine) is very useful in atonic dilatation. The addition of quinine sulphate is often of value. When there is diminished hydrochloric acid, small, often repeated doses of the acid are beneficial following the meals of solid food. Where hyperchlorhydria exists, sodium bicarbonate, calcined magnesia, and bismuth subnitrate are useful. If constipation persists in spite of the dietetic and physical measures above mentioned, glycerin suppositories are of service. Prognosis is good if full control can be had of the patient. The symptoms will often disappear long before the stomach resumes its normal size.—*The Medical Press*, 1899, vol. lxvii., No. 3134, p. 557.

Orexin.—Dr. Eugene S. Yonge notes that the loss of appetite which complicates so many systemic diseases is frequently amenable to empirical treatment alone, and demands to be dealt with *per se.* It is a symptom which especially attracts the patient's attention, and both mind and body are depressed by its persistence. The synthetic, either as basic or its salt, the tannate, seems to be generally useful. The latter form is preferred, which is found as a yellowish-white, odorless, almost tasteless powder, insoluble in water, but soluble in diluted acids, and therefore in the gastric juice. It shortens the process of digestion by stimulating the secretion of hydrochloric acid and by increasing the motor functions of the stomach. The dose is 10 grains thrice daily before meals, preferably in a hot liquid.—*The Therapist*, 1899, No. 5, p. 120.

The Treatment of Dysentery.—Dr. D. M. M. Ross finds treatment with ipecacuanha or epsom salts not satisfactory in many cases. He recommends the examination of the water drunk by the patient, and its interdiction when infected. Rest in bed is essential. Medicinal treatment, a moderate dietary, fomentations (hot) to relieve colic, removal and prevention of fecal accumulations, using ipecac, Epsom salts or castor-oil, rectal irrigations, when bearable, of potassium permanganate or boric acid solution (strength not mentioned), followed by starch and opium enemata, to relieve tenesmus, are valuable. On the appearance of fecal dejections intestinal antiseptics are substituted for irrigation, using bismuth salicylate or subnitrate, salol, resorcin, or naphtol. If there is reason to think the ulcers are slow in healing, astringent injections are indicated. Tonics and change of air are useful later. One patient died from perforation, and autopsy showed in other fatal cases how little is needed to cause perforation. Where the disease is severe warning is given against too greatly depleting the system with ipecac or Epsom salts, and an earlier recourse to intestinal antiseptics is recommended. Opium is best not used, as a rule; sometimes it is indicated, and its action is satisfactory. In every instance the circulatory system should be carefully watched.—*The British Medical Journal*, No. 2002, p. 1151.

Acute Dysentery.—Dr. J. T. Anderson recommends for an adult three ounces of magnesium sulphate divided into three doses, and one given every hour until the whole has been taken. Aside from the depletion and thorough drainage or cleansing process, it is claimed that sulphur is set free in the alimentary canal and antisepsis is obtained. If ulceration has become established, 30-grain doses of bismuth should be given every three hours. Strychnine arseniate is an excellent general tonic. The colon should be flushed several times daily with water containing either silver nitrate or zinc sulphate.—*Medical Mirror*, 1899, No. 7, p. 337.

Malignant Œdema Cured by Injections of Carbolic Acid.—Dott. Livio Amadori reports one instance in which the œdema was seated in the left upper eyelid, later spreading over the head and closing the right eye. Seven injections of one-half grain each were made into the swelling, and on the next six one-third of a grain. This treatment was followed by a rapid fall of pulse rate and temperature, and a relief of pain and swelling, the last completely disappearing in five days. The discoloration of the urine was not found later than thirty-six hours after the last injection. The tolerance of the patient toward the remedy is explained by the severity of the infection.—*Gazzetta degli Ospedale e delle Cliniche*, 1899, No. 67, p. 714.

The Sedative Action of Methylene-blue in Psychoses.—DR. PIETRO BODONI reaches the following conclusions: (1) This substance has an important action upon the organism, and particularly upon the nervous system, and preponderatingly upon the elimination of the blue itself; (2) the kind of disease has a marked influence on its elimination, which varies not only with its form but also with the period of the process; (3) it is not only eliminated in the urine, but also generally in the feces of the insane; (4) the presence of chromogen and not of the blue in the urine does not indicate any changes in the kidneys as such, but a disturbance caused by other factors; elimination of chromogen takes place either from a retardation of absorption and metabolism, by which the blue-reducing agents are changed into the chromogen, or on account of increased activity of other factors; (5) a retardation of the elimination of the blue and its leuco-derivatives is to be attributed to a general disturbance of the power of absorption of the tissues which may arise from different causes, according to the physiological condition of the organism; (6) in the insane the renal functions are less dependent upon the anatomical conditions of the kidneys than upon the general disturbances which the morbid process excites; (7) methylene-blue then can even less be utilized to control the anatomical and functional conditions of the kidneys in the insane than in other diseases, or even in healthy individuals. Noting the various effects of this substance upon nerve-tissue, blood-corpuscles, and various diseases, the results of intramuscular injections of one to one and one-half grains in fourteen patients are recorded. The general conclusion is that this substance is distinctly sedative, and should be included with anylene hydrate, sulphonal, trional, tetronal, chlorolore, duboisin, hyoscyanin, bromoform, and similar remedies used in psychiatric practice.—*Klinische-therapeutische Wochenschrift*, 1899, No. 21, S. 665.

The Antiseptic and Eliminative Treatment of Typhoid Fever.—DR. T. V. HUBBARD, after a plea for a fair trial of such methods of treatment and a statement that most of the opposition comes from those who have had no experience with these methods, goes on to explain his own practice in treating enteric fever. Basing his therapy on the fact that the fever is primarily a specific local infection, he proceeds to treat the infection locally by means of purges and antiseptics. Calomel $\frac{1}{2}$ grain, guaiacol carbonate 2 grains, podophyllin $\frac{1}{20}$ grain, are given in capsule every two hours for one or two days, depending on the condition of the bowels. This is continued until four or five intestinal evacuations have resulted for two successive days. The calomel is then omitted, and half a grain of menthol is added to the other drugs. If the bowels become inactive, as they often do, on discontinuing the calomel, small doses of salts or of Hunyadi water are given in the morning. Depending on the temperature and tympanites, at least two evacuations are required daily. If the temperature remains high or rises after four or five days' treatment, calomel is again given as above for twenty-four hours;

it invariably reduces the temperature, and results in general improvement in the patient's condition. The administration of guaiacol, menthol, and podophyllin are continued throughout the disease for their antiseptic properties. *Continuous* medication *early* in the disease is the *sine qua non* of success. Occasional spongings or ablutions with cold water are advised for the good effect produced on the peripheral circulation, the shock to the general nervous system, and the subjective sensation (?) of the patient; for the fever it is unnecessary; after the first few days, antipyretics are not needed. With this method of treatment digestion is more satisfactory, and more food is recommended than these patients received under the old régime. Average duration of the disease in ninety-seven tabulated cases was fourteen and two-fifths days. Stimulants are rarely required; delirium and complications are practically unknown. Where treatment is begun within eight days of the beginning of the disease, and systematically carried out, the temperature almost invariably returns to normal at the expiration of a week or ten days. —*The Virginia Medical Semi-Monthly*, 1899, vol iv. No. 77.

The Treatment of Autotoxic Dyspnœa.—Dr. H. Huchard discusses this symptom of alimentary intoxication. This may be due to uræmia, but in general it antedates such a condition. The ready proof that this is the case is found in the aggravation of the dyspnœa when the patient is upon a meat diet; the cause is the vaso-constriction which results from this diet. When fed exclusively upon milk, both this symptom and the marked pallor disappear. Since with this symptom there are signs of arterio-sclerosis and cardiac insufficiency, potassium iodide is indicated. Should œdema be present, theobromine in large doses is necessary.—*Gazetta degli Ospedale e delle Cliniche*, 1899, No. 65, p. 694.

The Hypodermatic Injection of Silver Nitrate Over the Course of the Vagi in the Treatment of Pulmonary Consumption.—Dr. T. J. Mays, believing that the lung lesion in pulmonary consumption is not the primary morbid change, thinks a *nervous* pathology underlies a rational therapy. He therefore uses largely strychnine, electricity, phenacetin, etc. The vagi are also locally treated by massage through the overlying structures. Cough, expectoration, and sense of oppression are benefited. More far-reaching effects were sought in the introduction of nitrate of silver immediately over the course of the vagi in the neck by arousing them from their "abnormal condition." Four to seven minims of a 2½ per cent. solution of silver nitrate (Merck's) answered well, though sometimes five minims of a 5 per cent. solution were required to bring about an inflammatory reaction. The point of injection is immediately over or behind the carotid artery, half-way between the angle of the jaw and the clavicle. To avoid puncturing either the carotid or jugular vein the skin is to be elevated and the needle introduced just beneath it. Cocaine injection (2½ per cent.) should precede the above, for the nitrate of silver is otherwise very painful. The same puncture suffices for both injections, the barrel of the syringe being removed, cleaned, and filled with the silver solution, the needle remaining *in situ*. A diffuse swelling, with redness and pain, appears. The injection is to be given on the side of the neck on which the affected lung is situated, and should be repeated in a week or ten days, unless the first injection is followed by too much irritation. Generally it is best to limit the injections to the affected side, with an occasional one on the opposite side. Analysis of results of above treatment in forty phthisical patients is as follows: Cough and expectoration were much benefited, and likewise dyspnœa and oppression. Through diminishing the cough sleep was much improved. Appetite grew more keen, even in patients far advanced in the disease, and the general strength improved. The physical signs also exhibited a marked change for the better, so much so that it was not merely a coincidence. Gain in weight was the rule, even in the sickest patients. The writer deduces from the above that best results are obtained: in the incipient stage, both as regards symptoms and physical signs, and in an advanced stage, both are benefited, sometimes remarkably. In a great majority in a far advanced stage, cough, expectoration, and other symptoms are temporarily ameliorated, but the local lung condition is unchanged. To the above method of treatment, hygiene, dietetics, and internal medication must be added. For the purposes of study these latter were omitted in the above cited group. These injections of silver nitrate may be valuable in asthma, chronic bronchitis, and in the treatment of the prephthisical stage in the young.—*Boston Medical and Surgical Journal*, 1899, vol. cxl. No. 6, p. 133.

GYNECOLOGY.

UNDER THE CHARGE OF

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Torsion of the Uterus by Tumors.—EHRENDORFER (*Monatschrift für Geb. u. Gyn.*, Band ix. Heft 3) reports the following case: Abdominal section was performed for the removal of a sessile fibroid tumor the size of a man's head in a woman thirty-six years old, whose principal symptom had been inability to empty her bladder for several months without the aid of a catheter. On opening the abdomen the uterus was seen to the left of the neoplasm, twisted entirely around its long axis, the bladder being drawn high upward and to the left. The tumor was so impacted in the pelvis and adherent to surrounding organs that it was removed only with great difficulty, the stump being secured with an elastic cord, and treated by the old extraperitoneal method. The convalescence was satisfactory, the patient being able to pass her urine on the third day.

Supravaginal Amputation of the Uterus for Fibromyoma.—At a meeting of the Leipsic Obstetrical Society (*Ibid.*) a discussion of the relative advantages of total extirpation and supravaginal amputation developed the fact that the latter was the favorite method. ABEL thought that the size of the stump was immaterial. Only two cases of subsequent sarcomatous degeneration had been reported. In young subjects it was important, he believed, to spare one ovary, and, if possible, a portion of the uterine mucosa, in order to preserve the function of menstruation.

SAENGER held that the possibility of malignant degeneration of the stump was so slight that it did not furnish an argument in favor of total extirpation. He was sure that a stronger pelvic floor remained after amputation.

ZWEIFEL said that for several years he had not observed exudates around the stumps. He made it a practice to leave as large a stump as possible, in order to preserve some of the mucous membrane.

Remote Results of Hysteropexy.—SEGOND (*Comptes Rendus de la Soc. d'Obst. de Gyn. et de Paed.*, April, 1899) reports a case of hysterectomy in a case in which he had performed hysteropexy six years before. The patient was relieved for two years, when she began to complain of dragging pains in the abdomen, although the uterus remained fixed to the wall. Previous to the operation she suffered from severe abdominal pain, tympanites, and evidences of intestinal obstruction. Examination showed that there was a certain range of mobility of the uterus, so that a pocket existed between the fundus and the anterior wall of the abdomen, in which it was inferred that a coil of intestine might have become caught. As the patient was near the menopause, the writer decided to perform hysterectomy. On opening the abdomen the fundus uteri was found to be attached to the parietal peritoneum by eight small bands, each about an inch in length, corresponding in number to the silk sutures which had been used; no trace of these sutures remained. Although no adherent intestine was seen, it was apparent that the conditions were favorable to imprisonment of a loop of gut in the space left in front of the uterus. The patient made a perfect recovery and remained well.

[This case furnishes a strong argument for the abandonment of ventrofixation and suspension in favor of internal shortening of the round ligaments. —ED.]

Operations on the Cervix Uteri from an Obstetrical Stand-point.—In a discussion on this important subject before the Paris Obstetrical Society (*Ibid.*), following the reading of a communication from Pinard, BOUILLY calls attention to the fact that if trachelorrhaphy or excision of the cervix is properly performed there is less likely to be dystocia than in cases in which the diseased tissue is not thoroughly removed.

DE RIBES had seen only one case in which delivery was rendered difficult by previous amputation of the cervix, as the tissues usually softened under the influence of pregnancy. In this instance manual dilatation overcame the obstruction.

SEGOND admitted that cases might occur in which rigidity of the cervix during labor would result as the result of excision, even when the operation was properly performed. He therefore believed that it should be limited to cases in which it was clearly indicated, and should not be performed indiscriminately where a simple curettement was often sufficient.

PORAK thought that gynecologists were not in a position to present reliable statistics, since only a small proportion of the cases were kept under observation. He cited two cases, in one of which he was called to perform embryotomy upon a woman who was moribund after being in labor for several days. The cervix, which had been amputated, remained rigid and undilatable, so that dystocia was complete. In another instance labor had continued for five days, on account of rigidity of the cervix, resulting from previous amputation, and rupture of the uterus occurred, which was treated successfully by immediate cœliotomy and suture of the tear. In the writer's opinion rigidity of the cervix in these cases was due to incomplete removal of all the cicatricial tissue during the operation.

LEPAGE was of the opinion that non-dilatability of the cervix during labor was due not only to failure to obtain primary union after excision, but to the fact that too radical an operation was often performed, so that no vaginal portion whatever remained. It was easy to understand that in the event of a laceration of such a cervix the lower uterine segment would be apt to be involved. In short, it was important for the surgeon to bear in mind when operating upon the cervix not to remove any more tissue than was necessary, in order not to interfere with the physiological development of the gravid uterus.

PINARD, in closing the discussion, stated that rigidity of the cervix during labor was not confined to operations performed for the removal of diseased tissue, and cited two cases of simple incision for stenosis in which labor was attended with the same complication which had been described. The speaker was in favor of immediate trachelorrhaphy in cases of extensive laceration, by which subsequent cicatrization was prevented.

The Germ Theory as Applied to Gynecology.—In a recent address before the British Gynecological Society, BANTOCK (*British Gynecological Journal*, May, 1899) provoked a vigorous discussion by declaring his opinion that the presence of specific micro-organisms was "the result and not the cause of disease." He stated that he was "still content with making his hands as clean as an ordinary washing with soap and water would make them, thus removing Lister's 'grosser forms of septic mischief.'"

It is hardly necessary to state that the consensus of opinion was entirely opposed to the eminent reader, whose paper was regarded as an individual confession of faith rather than a scientific argument.

Diffuse Adenoma of the Endometrium.—OLIVER (*Ibid.*) reported the case of a virgin, aged thirty-four years, who had menstruated profusely for ten years. On examination a firm uterine tumor was felt, extending two and a half inches above the symphysis pubis. Two mucous polypi protruding from the cervix were removed, and the hemorrhages were checked for two years, when they returned and became continuous. The polypus was excised and a teacupful of soft tissue was removed from the uterine cavity, which presented the microscopical appearance of simple adenoma. The uterus was subsequently reduced so that it could not be palpated in the abdomen, but two months later the patient returned complaining of a constant watery discharge. A second curettement resulted in the removal of another cupful of adenomatous material, but the watery discharge continued, so that abdominal hysterectomy was performed successfully five months later.

The uterus weighed nearly two pounds, and, incising it, the entire endometrium was seen to be studded with nodules varying in size from a pea to a walnut, a few being polypoid. There was general thickening of the muscular wall, with general evidence of infiltration of the neoplasm.

The reporter hesitated about regarding the condition as malignant, on account of the history of the case, which showed that the growth had probably existed for several years. The patient was the youngest in whom diffuse adenoma of the endometrium had been reported.

Vapo-Cauterization of the Uterus.—Van de Velde (*Centralblatt für Gynäkologie*, 1898, No. 52) reports a fatal case in which steam at 105° C. was introduced into the uterus for five minutes for the relief of climacteric hemorrhages. The patient died of septic peritonitis on the fourth day after the operation. Autopsy showed that a perforation had occurred at the fundus. The writer adds a warning against the use of vapo-cauterization for hemorrhage in which there is the risk not only of perforation, but of subsequent obliteration of the uterine cavity and complete atrophy of the organ. He would limit its application to the treatment of inoperable carcinoma.

Pincus (*Centralblatt für Gynäkologie*, 1899, No. 4) criticises the foregoing report, affirming that the accident was due not to his method but to its faulty application, since the introduction of the steam should be limited to half a minute. He claims that by adhering strictly to the rules laid down by him the accidents and subsequent ill results referred to cannot occur.

OBSTETRICS.

UNDER THE CHARGE OF

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Three Cæsarean Sections upon the Same Patient.—In the *Centralblatt für Gynäkologie*, 1899, No. 15, Pollak contributes a very interesting paper upon this subject. He has collected thirty cases, in which two Cæsarean operations were performed upon the same patient. He has found twelve cases in which the operation was performed three times, four cases in which four children were delivered by this method, and one case in which a mother bore five children by repeated Cæsarean section. His own case of three operations upon the same patient was as follows:

When the patient first came under observation she was nineteen years old. She had a rhachitic pelvis, and labor was induced and terminated by version, followed by craniotomy.

When her next pregnancy occurred the usual conservative Cæsarean operation was performed, the womb being closed by buried silk sutures, and the peritoneum united by fine continuous silk. Mother and child made an excellent recovery. The second operation was more than a year later, and was successfully performed in the same manner. There were adhesions between the mesentery, the uterus, and the abdominal wall, but these were very readily separated. Mother and child made a good recovery without complications. The children were rhachitic, and shortly after the second pregnancy both of them died. When the patient again became pregnant she declined any form of delivery except the Cæsarean operation, because she desired a living child. This was accordingly performed in the same manner as the preceding, and with equal success.

At each operation after the first the tissues were very carefully inspected, to observe the scar which was present. The wall of the uterus was firm and solid, not thinned or abnormal. The adhesions which existed between the wall of the abdomen, the mesentery, and the uterus were not resisting, and were readily separated. Each time the incision was made so far as possible through fresh tissue, and in each operation silk was used to close the parts. Certainly nothing could have been more successful than these three operations.

Pollak calls attention to a phenomenon which has been observed by other Cæsarean operators—namely, that the child is slightly asphyxiated and delays respiration for a few moments. It is, at first sight, not easy to account for this, as the child has had but little birth-pressure. Pollak thinks it due to the anæsthetic which the mother has taken during the operation.

Complete Rupture of the Uterus.—At a recent meeting of the Gynecological Society of Dresden, LEOPOLD (*Centralblatt für Gynäkologie*, 1899, No. 15) reported the case of a woman aged thirty-five years, who had borne four children, and who was in labor with the fifth. The left shoulder presented, and the progress of labor ceased. On admission to the clinic the patient was found considerably shocked, and rupture of the uterus was diagnosticated. She was immediately prepared for operation and the abdomen was opened. Considerable clotted and fluid blood was found in the abdominal cavity. The child was lying across the abdomen, its head covered by the membranes. After the child and appendages had been removed a transverse laceration across the anterior wall of the uterus was found. This extended through the broad ligament of the right side, and the serous membrane had been separated for some extent by blood clot.

As it was impossible to suture the uterus, it was amputated, gauze drains were inserted, and the abdomen was closed. Death followed on the ninth day afterward, and post-mortem examination showed purulent peritonitis, with partial occlusion of a portion of the small intestine. Upon investigating the history of the case, a midwife had been in attendance, who had failed to promptly summon the aid of a physician. She was accordingly fined for this neglect.

A Case of Rupture of the Uterus Treated by Vaginal Extirpation.—In the *Centralblatt für Gynäkologie*, 1899, No. 13, SOLOWIJ contributes the interesting report of a case of ruptured uterus, in which the womb was removed by vaginal extirpation.

The patient was thirty-four years of age, and had borne two children spontaneously. When admitted to the hospital the abdomen was distended and painful. The fœtal heart-sounds could not be heard, and a bloody discharge was present. The placenta could be felt in the vagina, but the external os could not be reached. On introducing the hand to perform version the operator discovered that the anterior wall of the womb was torn above the cervix. The fœtus was in transverse position, between the uterus and the abdominal wall.

After the patient had been anæsthetized the placenta was first removed, and the right foot of the child brought down. The child was delivered without great difficulty and its appendages removed through the uterus. There was no hemorrhage, and the womb was readily removed through the vagina. The patient, however, perished in shock within a few hours.

When a post-mortem examination was made it was found that the tears in the uterus were extensive, and that a hæmatoma had formed under the serous membrane.

The Use of the Rontgen Rays in Diagnosticating Pelvic Deformities.—Albert recently demonstrated to the Gynecological Society of Dresden (*Centralblatt für Gynäkologie*, 1899, No. 15) his method of obtaining a tracing of the brim of the pelvis and the position of the child by the use of the Röntgen rays. He obtained the best results in examining the superior plane of the pelvis, and was successful in diagnosticating flattened pelvis. In one of his cases the patient laid flat upon the back, and in others assumed a partially sitting posture. He was enabled by these means to obtain a measurement of the upper portion of the pelvis, which gave a good indication of its capacity. He exhibited diagrams illustrating these researches, and called attention to the difficulties arising from the fact that the shadow of the promontory of the sacrum became confused with that of the symphysis; but from three to four minutes' exposure to the action of the rays was required. He also exhibited pictures of the fœtus in the fifth, sixth, eighth, and tenth months of development.

Torsion of the Pedicle of a Dermoid Cyst Occurring After Abortion.—In the *Centralblatt für Gynäkologie*, 1899, No. 13, Unterberger adds to the literature of ovarian tumors an interesting and uncommon case.

The patient was admitted to the hospital with an incomplete abortion. Curetting was advised, and on examination a dermoid cyst, very mobile, was found in the abdomen. The presence of the tumor had been discovered three years before after a confinement. The curetting was followed by no disturbance whatever, and on the fifth day afterward a bimanual examination was made. When this was done the tumor was found above and to the right side at the border of the ribs, and not so freely movable as before. This was thought to have been caused from a lack of free bowel movements. Soon after the examination the patient was taken with colicky pains, the abdomen became distended, very sensitive, and the pulse rapid, and the tumor was discovered in the left half of the pelvis. Torsion of the pedicle was diagnosticated, and the patient was operated upon as soon as possible. The diagnosis was correct. There were two twists in the pedicle to the left, with beginning engorgement and the formation of a blood clot. The operation was fortunately successful, the patient making a complete recovery.

As regards the frequency of this accident, Küstner thinks that it occurs in 47 per cent. of dermoid cysts, Thorn in 35 per cent., Schauta in 20 per cent., Demakis in 17 per cent., while the older writers did not think it oftener than from 6 to 10 per cent. In 500 ovariotomies Spencer Wells saw this complication 12 times. The writer in 41 ovariotomies has seen 3 cases of twisted pedicle.

Subcutaneous Emphysema Complicating Labor.—Among the rarer complications of active labor is the occurrence of diffuse subcutaneous emphysema. This must evidently result from violent expulsive efforts on the part of the mother, and if accompanied by infection may be of a very serious nature.

In the *Centralblatt für Gynäkologie*, 1899, No. 15, is an account of such a case, given by MAISS before the Gynecological Society of Dresden.

The patient was a young woman, aged seventeen years, who was in active labor when she entered the hospital. The occiput was upon the right side, the head large and hard and movable above the pelvic brim. The pelvis was a symmetrically contracted and also flattened pelvis. In view of the conditions present the membranes were retained as long as possible, and as the birth-canal was small and resisting, a colpeurynter was introduced. The patient had very strong pains, the occiput rotated posteriorly upon the right side, and the patient was placed in Walcher's position, to favor the descent of the head. Labor proceeded steadily, but slowly, the heart-sounds of the child remaining good. When the head had reached the pelvic floor, after some especially strong pains, the woman's face was observed to become dusky and greatly swollen, this condition extending downward upon the chest. Subcutaneous emphysema was evidently present. The child was at once delivered, and survived its birth three hours, when it perished from hemorrhages into the medulla and beneath the dura mater.

The emphysema did not increase nor did it cause the mother especial annoyance. Cold compresses were placed upon the skin, and the swelling steadily subsided. A small incision was made in the regions of the clavicles, and thirteen days after the birth of the child the emphysema had disappeared. The mother's recovery was complicated by a foul vaginal discharge, which contained gonococci and staphylococci. She ultimately made a good recovery.

In explanation of this condition it has been alleged that during excessive labor pains, while making straining efforts, air entered the subcutaneous spaces at the apices of the lungs through rupture of a small vesicle, or gained access to the circulation in some manner through the uterus. The exact mechanism of this phenomenon is not, however, known.

Delivery of the Arms in Breech Cases.—In the *British Medical Journal*, June 10, 1899, CALLENDER describes an expedient successfully employed in a breech case, where the arms were displaced upward. He knotted a corner of a soft handkerchief and passed it around the shoulder which lay anteriorly. It was then pushed along the arm to the elbow, and kept there, while with the other hand traction was made obliquely across the anterior aspect of the child's body. The arm was readily brought down in this manner.

Experiments Upon the Closure of the Fallopian Tubes.—In the *Archiv für Gynäkologie*, 1899, Band lviii. Heft 2, FRAENKEL gives the results of experiments conducted with a view of determining an efficient method for closing the lumen of the Fallopian tubes.

He ligated the tubes at various points with catgut, silk of different sizes, and on some severed the tubes with the thermo-cautery. Most of these attempts, however, were unsuccessful, and the lumen of the tube was found to persist, and to be reformed in spite of ligation. Various changes in the tubes followed ligation, the ligatures when silk remaining unchanged. He then resected a portion of the tube and examined the animal ninety days after the experiment. It was found that the lumen of the tube had been apparently restored, and the same result followed with the use of the thermo-cautery. In some cases hydrosalpinx formed and, in a few, adhesions.

He has collected a number of clinical cases where a considerable portion of the tube has been removed, but where pregnancy subsequently occurred, and this result is illustrated in his own experiments when he found the tube restored after amputation and ligation. He reaches the conclusion that the function of the tube can be destroyed only when the tube is entirely removed and its uterine termination exsected and the tissues closed with a flap of peritoneum.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

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Exophthalmic Goitre.—JONNESCO (*Centralbl. f. Chir.*, February 11, 1899; *Medical News*, April 22, 1899) reports that in ten cases of true exophthalmic goitre a cure was obtained in six and improvement in four by resection of the cervical sympathetic. The exophthalmos disappeared first, then the nervousness and tachycardia, and finally the goitre. The results upon cases of secondary exophthalmic goitre were less successful.

Operations for Stricture of the Trachea.—DRS. W. S. JONES and W. W. KEEN, of Philadelphia, report (*Journal of the American Medical Association*, June 10, 1899) two cases successfully operated upon by Professor Keen. One was for removal of a diaphragm following an attempt at suicide, and completely closing the trachea above the fistula occupied by the tracheotomy-tube. Dr. Keen got access to the diaphragm by an external incision in the middle line, which led him directly upon the œsophagus, showing that the severed tracheal rings had become separated by retraction. The diaphragm was dissected out and the two ends of the trachea sutured together. The result has been completely successful, and the patient breathes without his canula. The tracheotomy-tube was permanently removed upon the sixth day, and the fistula became closed entirely at the end of the sixth week.

We believe this to be the only case of the kind upon record.

The second case was a stricture due to a membranous diaphragm with a very small orifice a short distance below the vocal bands. In this case Dr. Keen likewise got access to the obstruction by external incision. It was found necessary not only to split the trachea for six or seven rings, but to split the cricoid cartilage also. The upper border of the stricture was found at the third tracheal cartilage, and extended over the third and fourth and to the upper border of the fifth. The fibrous stricture was dissected out and the trachea was completely closed by catgut stitches passing through the perichondrium and pre-tracheal tissues.

These operations were performed with the patients in the Trendelenburg posture.

Foreign Body in the Bronchus.—The foreign body was the tracheal portion of a hard-rubber tracheotomy-tube, which had become detached from its shield.

Dr. A. Coolidge, Jr., of Boston, by the aid of reflected sunlight, saw the foreign body in the right bronchus, its upper end about one-half inch below the bifurcation, whence it was seized by a long pair of alligator forceps and removed without difficulty. The tracheal opening had been enlarged and the urethroscope introduced to facilitate manipulation.—*Transactions of the American Laryngological Association*, *Medical News*, July 1, 1899.

Bronchocele.—Dr. Edmund W. Holmes, Demonstrator of Anatomy in the University of Pennsylvania, favors a lateral route behind the sternocleidomastoid muscle for gaining access to all deep-seated growths below the level of the upper margin of the thyroid cartilage (*International Clinics*, vol. ii., ninth series). He reports a successful operation for bronchocele and two for cervical sarcoma.

Stenosis of the Larynx.—In recurring laryngeal stenosis after intubation, Dr. Louis Fischer (*Journal of the American Medical Association*, May 13, 1899) indorses the opinion of Dr. O'Dwyer, that this condition was usually the result of traumatic injury, either from improperly constructed or illy adapted tubes, or from the accumulation of calcareous deposits upon the tube. He had employed with much success in these cases a method of intralaryngeal treatment of the ulcerated surface, which, too, had been suggested by O'Dwyer, and which consisted in the use of tubes coated with medicated gelatin. The best results were obtained by immersing a rubber tube in a hot solution of gelatin containing either 25 per cent. of alum, 20 per cent. of ichthyol, or paraffin medicated with 3 per cent. of iodoform or europhen.

Complete Bilateral Recurrent Paralysis due to Carcinoma of the Œsophagus.—Dr J. Herzfeld reported this case before the Berlin Society of Laryngology, July 1, 1898 (*Annales des Maladies de l'Oreille, du Larynx, etc.*, August, 1899).

A man, aged sixty-four years, began to experience difficulty in swallowing three years before, and, the trouble increasing, frequent dilatations with sounds were necessary. Within the last three months gradual increasing hoarseness intervened. In probing the œsophagus the instruments of large calibre encountered an obstacle about the level of the bifurcation, while smaller sounds reached to the cardia without difficulty. The laryngoscopic image showed both vocal bands in the cadaveric position, whether during expiration or phonation. The patient died suddenly of a hemorrhage of the stomach after probing. The autopsy revealed a carcinoma of the œsophagus, extending to the posterior wall of the trachea and completely paralyzing the two recurrents.

Primitive Medullary Carcinoma of the Epiglottis.—This case was reported by DR. FLATAU (*Annales des Maladies de l'Oreille, du Larynx, etc.*, August, 1899), and when first seen was limited to the epiglottis, concealing the valleculæ and a portion of the base of the tongue. It had begun three or four months after the existence of a sensation of a foreign body, difficulty in swallowing, and occasional slight pains. The growth was removed by Professor Gluck, who performed subhyoid-pharyngotomy, preceded by preliminary tracheotomy. The base of the tongue was found sufficiently involved to make it necessary to extract a portion of the hyoid bone. Fourteen days later the patient was taken with intestinal hemorrhages, the cause of which remained undetected.

Adenocarcinoma of the Nose.—At the recent meeting of the American Laryngological Association, DR. JAMES E. NEWCOMB, of New York (*Medical News*, July 1, 1899) reported a case in a female subject, aged sixty-one years, in which reproduction of tissue had followed intranasal removal. Recurrence had twice followed, in which a radical operation seemed necessary. Six other cases were mentioned to be added to those enumerated in a table prepared by Dr. Hopkins.

Suppuration of the Accessory Sinuses of the Nose.—By far the most valuable practical contribution to this subject which has been published of late is an exquisitely illustrated article by DR. JACOB E. SCHADLE, of St. Paul, Minn. (*St. Paul Medical Journal*, January and February, 1899), on the etiology and diagnosis of empyema of the accessory sinuses of the nose.

Eight photographic plates from the wet-preparation admirably illustrate the subject, the text of which will hardly bear condensation in the few paragraphs we could devote to it, so that we must refer our readers to the original; but we may say that great stress is laid upon the proper appreciation of the normal and abnormal anatomy of the parts before disease as well as after it.

Nasal Epilepsy.—E. MEYER (*Annales des Maladies de l' Oreille, du Larynx, etc.*, August, 1899) reports this case in a man, thirty-two years of age, who had been affected since he was sixteen years old. The paroxysms occurred at irregular intervals of from three to ten weeks, and each paroxysm was preceded by an abundant purulent discharge from the left nasal passage. An empyema of the maxillary sinus was recognized, which was discharged by trephining the anterior wall and followed by the ordinary after-treatment. Since this time the epilepsy has not reappeared, but Dr. Meyer was not sure a cure had been definitive.

Fibroma of the Nasal Orifice.—This unusual case, reported by DR. ALEXANDER (*Annales des Maladies de l'Oreille, du Larynx, etc.*, August, 1899), occurred in a female, fourteen years of age. It occupied the left wing of the nose and nearly filled one-half of the nasal passage.

Neurasthenia in Certain Affections of the Nose and Throat.—DR. MARCEL NATIER (reprint from *La Parole*, 1899) reports two cases—one due to an elongation of the uvula and disappearing after section of the same, and another caused and kept up by an artificial ulceration on the nasal septum of the right side. Both occurred in female subjects.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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The Fate of Embryonic Cells Implanted in the Bodies of Adult Animals.—BIRCH-HIRSCHFELD and GARTEN (*Beiträge zur path. Anat. und allg. Path.*, Band xxvi. No. 1, p. 132).

These experiments consisted in the introduction of embryonic cells into an adult animal of the same species, but differed somewhat from previous attempts. Very young embryos were used, as their proliferation capacity is much greater. Undifferentiated cells were used to see if there would occur a later differentiation. No whole embryos or even whole limbs were used, but teased cells, that they might be better nourished and that different tissues might be reproduced. For implantation a tissue was sought of which the nourishment would be abundant, and which could easily be differentiated from the implanted tissue. For these reasons the liver was selected.

The embryos were teased out in salt solution, which was then injected under antiseptic conditions into the portal vein. Death followed after some days. Then another method was tried. After laparotomy the solution was repeatedly injected directly into the liver. Thus the exact place was noted, and later could be easily excised. By careful technique the same animal was sometimes operated on three or four times. Rabbits and their embryos were used first, then chickens, goats, salamanders, and frogs. Positive results were obtained in more than one-fourth of the cases.

Controls were made by injecting embryonal cells which had been killed by boiling.

The commonest result was the formation in the liver of cartilaginous nodules up to the size of a pea. Embryos of the same size and age as those injected showed no cartilage whatever, therefore a differentiation after implantation is argued.

The younger the tissue injected the more positive the results. Older cells are rapidly absorbed. Calcification was sometimes found, and often showed absorption when the surrounding capsule was not very firm.

Cartilaginous nodules were found in the periphery of the lung, evidently due to embolism. They showed the same structure as the growths in the liver.

In addition to the injection of embryonic cells, an attempt was made experimentally to change the condition of the liver. After two chickens had been injected a sterile platinum wire was passed through the liver, and silver electrodes at the ends sewed to the abdominal wall. Through this wire an electric current was passed five minutes each day sufficiently strong to warm the wire. In these cases the proliferation was much further advanced. Beside cartilage there were found adenoid tissue, epithelial-like cells, and pigmented epithelium.

Giant-cells were sometimes found, which the writers believe were formed as the result of the irritation of foreign bodies (injected material). These apparently were formed from the endothelium of the capillaries. They may also arise from various fixed cells, as shown by their origin from granulation cells in the periphery of a different nodule. Owing to lack of mytosis the writers regard them as arising from the confluence of many cells.

Conclusions are drawn as follows:

The tendency to proliferation is very different in embryonic and adult cells. A functional stimulus is necessary for cell-preservation and growth.

Embryonic cells differentiate after implantation. This is a specific property of the cell, and is not dependent on the demands of the entire adult organism.

A permanent existence for the new growth has not been demonstrated by these experiments. They are not tumors, as they are not progressive. But while Cohnheim's theory is not confirmed, it is not disproved.

The positive results of the experiments have been these:

1. The injection of teased embryonal tissue into the adult liver yields a tumor-like new-growth in the liver and lung.

2. In chickens, some weeks after the implantation of one to five-days' old embryos, there has arisen in the liver adenoid tissue, epithelial-like cells, and pigment cells.

3. The best results follow when the liver is periodically stimulated.

4. The implanted cells undergo further differentiation.

5. The growth is not permanent. After weeks or months there occurs encapsulation, regressive metamorphosis, such as calcification, etc., and finally sequestration and absorption by surrounding tissue.

Chronic Fibrinous Bronchitis.—SCHMIDT (*Centralblatt f. allg. Path. u. path. Anat.*, Band x. Nos. 11 and 12. The clinical record of this case is interesting from the point of etiology. The patient, aged fifty-two years, was suddenly chilled seventeen years ago after a fright from a burnings theatre; then followed nose-bleed and cough, with expectoration of slimy sputum, but no casts. Eight years ago there were daily chills, with coughing in the morning. At present there is expectoration of branched plugs, with a peculiar feeling in the right lung. Lying on this side would cause a "kochen" in the lung. The expectoration is without effort, and in the last four weeks has occurred daily. There is some dyspnœa, and for the last six months gravel in the urine. The patient is nervous and subsists largely on a meat diet. Eczema is present on the hands and elbows. There is a faint tendency to obesity.

The plugs found in the expectoration swell in dilute acetic and hydrochloric acids, and are completely digested in a few hours at 37° C., hence the writer concludes they are mostly fibrin. They are light yellow, elastic, soft, slippery, the size of a goose-quill, and may reach a length of 12 cm. They number ten to fifteen a day, and show blood at the small ends, but never in profusion. Some of these smaller ends are actual blood-cylinders of fused corpuscles, which the writer thinks are due to congestion, with capillary thrombosis and secondary changes of red blood-corpuscles into hyaline bodies.

Cholesterin is abundant, especially near what Schmidt calls corpora lecithinoidea, which latter resemble in appearance and chemical action corpora amylacea, but there is no demonstrable nucleus and no radiate striations. The cylinders have parallel glistening sides, open ends, and their length is in inverse proportion to their width. The wall may be thickened, the centre a mere capillary tube or entirely obliterated. The contents of these tubes are transparent, and may include erythrocytes, leucocytes, and mucous corpuscles or their nuclei.

The above-mentioned corpora lecithinoidea are also within the tubes, may be united with the wall of the latter, and at the ends may even fuse with it. Hence they have the same genesis.

The cylinders are from 5μ to 30μ (mikrons) in width, and are commonest in the finest divisions of the casts. They are surrounded by many epithelial cells, filled with fat, much detritus, cholesterin, and concentrically striated lecithin-like bodies. Both bodies and tubes give no reaction with iodine. Under ether the tubes become lax, swell up, and undergo a sudden, complete destruction, with loss of refraction. Chloroform and carbon disulphide give the same results. Acids cause no change. From these reactions and the invariable presence of blood and epithelial cells and detritus, Schmidt calls the tubes "lecithinoidschlauche" and the smaller bodies "corpora lecithinoidea." The tubes he believes to arise from a peculiar change of hyaline capillary thrombi.

From his study of the case Schmidt calls attention to the following points:

The association of chronic fibrinous bronchitis and metabolic anomalies, such as meat, diet, obesity, gravel, eczema.

Congestion of lungs and heart degeneration, with emphysema and atheromatosis, and the localization of the process in the right lung.

Microscopically noteworthy are the hyaline blood-cylinders, the corpora lecithinoidea (like the prostate bodies), soluble in ether, chloroform, and carbon disulphide, the lecithin-like tubes with similar reaction. The presence of fatty epithelial cells is a favorable point in prognosis. The coagula are composed mostly of fibrin.

Fragmentation of the Myocardium.—STRICKEISEN (*Ziegler's Beiträge*, Band xxvi. Heft 1, p. 105–130).

One hundred and fifty cases of death by violence were investigated with reference to fragmentation of the heart muscle-fibres.

The most frequent location was in the papillary muscles and wall of the left ventricles; then the septum and the papillary muscles and trabeculæ of the right ventricle. The auricles were never affected.

The fracture was often found near the nucleus. Cell ruptures predominated, but separation of cells occurred. The intercellular tissue was normal. Hemorhages were never observed. As for the evidence of other pathological processes, fatty degeneration was rarely found in cases of fragmentation, but pigment atrophy was a predisposing cause.

In the hundred and fifty cases fragmentation was found in 56.6 per cent. They included phthisis, acute peritonitis, pneumonia, carcinoma, typhoid, sepsis, etc. Two cases of tetanus showed marked fragmentation.

The main cause lies in the violent contraction of the heart-muscle, as fragmentation was very frequently found in death by asphyxia. Its absence in fatty degeneraton is explained by a weakened heart, which cannot contract to the point of rupture and fragmentation of fibres. Pigment atrophy, on the contrary, leads to increased frangibility of the muscle elements.

A primary weakening of the heart-muscle can be excluded by the very frequent occurrence of fragmentation in cases of accidental death.

Chemical and bacterial causes have been urged, but anatomically the fragmentation is the same, and the interstitial changes are wanting.

If it occurred long before death there would be changes in the fibres as well as interstitial changes. On the contrary, the ruptured ends match and seem normal.

As to the medico-legal question of fragmentation as a cause of sudden death, the writer answers it in the negative. Such cases usually follow great efforts or acute infectious diseases. Probably the heart weakens, vascular pressure is diminished, and asphyxia phenomena follow with fragmentation. This may explain sudden deaths at the very beginning of chloroform anæsthesia. *Fragmentation myocardii* is strongly denied as the actual cause of any sudden death.

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THE

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DECEMBER, 1899.

APPENDICITIS.[1]

By Maurice H. Richardson, M.D.,
of Boston,
Assistant Professor of Clinical Surgery in Harvard University, Surgeon to the Massachusetts General Hospital.

I. "Should every case be operated upon as soon as the diagnosis of appendicitis is made?"

II. "Should the appendix be removed in every case?"

Summary.

I. Should every case be operated upon as soon as the diagnosis is made?

As a rule, the appendix should be removed if the diagnosis is made in the first hours of the attack.

After the early hours operation is advisable;

1. If the symptoms are severe, and especially if they are increasing in severity.
2. If the symptoms, after a marked improvement, recur.
3. If the symptoms, though moderate, do not improve.

The wisdom of the operation is questionable:

1. In severe cases in which an extensive peritonitis is successfully localized and the patient is improving.
2. In cases which are at a critical stage, and which cannot successfully undergo the slightest shock.

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[1] Read before the American Surgical Association at Chicago, May, 1899.

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II. Should the appendix be removed in every case?

It should not be removed:

1. In localized abscesses with firm walls.
2. When the patient's strength does not permit prolonged search.

It should be removed whenever the peritoneal cavity is opened, unless the patient's condition forbids.

The appendix should be removed in all cases as soon as the inflammatory process has had time completely to subside—in from two to three months after the attack. In cases simply drained, the scar tissue should be excised, the appendix removed, and the wound securely sutured.

The present communication I offer with much hesitation, because I can contribute so little that is new to the discussion of appendicitis; yet it may seem, perhaps, not uninteresting to present this subject in the shape which it has gradually taken in my mind after observing a large number of cases.

The questions for consideration are all surgical, and the surgeon should in every case be given the earliest opportunity for deciding them. Appendicitis is a surgical disease; it should be admitted to surgical rather than to medical wards.

From month to month, from year to year, I find that my conclusions with reference to some of these questions change; that they depend for the time upon the point of view from which they are regarded, upon the class of cases met with, upon the results of treatment in my own cases upon the experience of others; that at times no course of treatment seems too radical, at others, none too conservative. A series of nineteen consecutive deaths after operation in acute appendicitis (such an experience has occurred, it is said) may well suggest the query whether it were not better to abandon a hard-and-fast rule to operate in every case, and to follow rather a policy of discrimination and selection. If it is said that such an unfortunate experience demands more strongly than ever that every case should be operated upon as soon as the diagnosis is made, it should be added, but only when the diagnosis is made early. On the other hand, it is asserted by some physicians that they have had no cases perish under palliative treatment, and hence no operation is ever necessary. Though my experience has never ranged between such extremes of absolute success and absolute failure, whatever my methods of treatment have been, I cannot but admit that a series of severe cases of appendicitis in which there has been a large mortality after a comparatively early operation has excited a strong doubt as to the wisdom of intervention in every case. The large percentage of recoveries in severe cases in which, for one reason or another, no operation has been performed adds to the doubt already excited. When, after a large experience, the surgeon is convinced that in some cases at least the operation adds the last straw, then it seems that possibly it is unwise to obey an invariable rule of procedure—that there may be some other course worth considering.

If all cases recovered after operation this question would be much simplified. There is a time for operation when practically all patients will recover; but there is also a time when many will die—when an unwise operation or an unwise palliation will be fatal. In many cases the choice of methods will influence for good or for bad the result. This, it seems to me, is the important point for discussion. If in every case of appendicitis we operate as soon as the diagnosis is made, we may operate at that very time, I contend, when the patient's best chance lies in conservatism.

In the discussion of appendicitis it must be borne in mind that we are speaking of cases which are pictured in words—not cases under common observation at the bedside. What one may call a severe case, another may call a mild one; what one a hopeless, another only a serious case; what one a general peritonitis, another a simple serous exudate. Such a variation in the way of looking at things is the "personal equation" of the observer, and it cannot be estimated in a body of men who see nothing of each other's work. Among colleagues, however, all must admit that the personal equation is an important element, and that the severity of a case varies, when reduced to language, with the man. In speaking, therefore, of types of appendicitis, of illustrative cases, of *severity, urgency, hopelessness* and the like, we must bear in mind that, perhaps, we may not be speaking of exactly the same conditions; and that, though we may differ in the discussion of appendicitis here, at the bedside we very likely should be in perfect accord. The surgeons of the Massachusetts General Hospital, for example, though they may differ, perhaps, among themselves as to questions raised in this discussion as much as the members of this Association, actually at the bedside seldom, if ever, disagree as to the wisdom of operation. Even in the questions presented here there is rarely a strong divergence in opinion when it comes to the application of general principles to specific cases.

In the beginning, the operations for the removal of a perforated and gangrenous appendix were attended by such excessive mortality that the question of surgical intervention seemed extremely grave. To open the abdomen and remove such an appendix was to invite almost certain disaster, for it seemed almost impossible to avoid a general peritonitis. The natural result was to insist upon earlier operations. With earlier operations it was seen that the general infections and the mortality diminished, until it has been shown that practically all operations are successful if performed before the infectious process has reached the peritoneum. Such is the conclusion to which I, at least, have been forced by a considerable experience in the removal of such appendices. When the infectious process has reached the peritoneum, however, the prognosis, for reasons that will presently be given, is in many cases better under palliative treatment than under operative.

Furthermore, the interval operation certainly presents advantages which justify, in a certain class of cases, the risk of waiting.

I. The question as to operation in all cases as soon as the diagnosis is made depends upon the period of the disease; for the diagnosis may have been made on the first, second, or third (or later) days. *Very early* in the disease means in the first twenty-four hours of it—at its very onset, when the symptoms are the most acute, the prognosis most uncertain. If at any time, it is at this time that the rule should be to intervene. With pain, vomiting, tenderness, abdominal rigidity and fever, the gravest crisis may be at hand. If the diagnosis of appendicitis is made now, the prognosis after operation is better than it would be a day or two later, when, perhaps, a general infection would have taken place. A positive diagnosis at this time, however, cannot always be made—the symptoms of a great variety of acute abdominal lesions begin in precisely the same way. Perforation of the stomach, acute cholecystitis, acute pancreatitis, mesenteric thrombosis and embolism, extravasation from the intestines, acute salpingitis, ovarian tumor with twisted pedicle, rupture of abscesses, acute intestinal obstruction, congenital malformations of the intestine, ruptured extra-uterine pregnancy—in fact, almost all acute abdominal lesions present symptoms that may suggest appendicitis as strongly as anything else; but so do acute intestinal disturbances dependent upon errors in diet—acute gastric and intestinal catarrhs, ptomaïne poisoning, cholera morbus—or even lead colics.

As a rule, operation is advisable as soon as the diagnosis is made in those severe cases of acute appendicitis which are attended by the initial symptoms of peritoneal invasion—in other words, those seen in the early hours of the attack. Furthermore, this exploration is demanded under the conditions of peritoneal infection described above, even if the diagnosis of appendicitis is not made, because these symptoms demand intervention of themselves, whether an exact diagnosis is made or not.

On the other hand, it seems questionable whether one should open the abdomen at the onset of an appendicitis of mild type, even if the diagnosis is reasonably clear; first, because the disease is often so mild, and its manifestations so trivial, that intervention can be justified only on the ground that a trivial attack is likely to become suddenly severe—an event which, as far as my experience goes, is extremely improbable. To this category of mild attacks belong the cases in which there is pain without nausea, vomiting, rigidity, or fever—attacks which subside with great rapidity and which call for intervention only when they recur so frequently as to produce disability—appendicular colics rather than true infections. Not that removal of the appendix in such cases is to be regarded as a serious matter—practically all the cases recover—but the lesion is not grave enough to justify even so safe a procedure as abdominal section until repeated recurrences demonstrate invalidism.

Cases might be introduced here to illustrate the practical difficulties that may arise and have arisen in the solution of these questions, the disasters that may attend the treatment of acute abdominal lesions—cases which apparently demanded operation, but in which operation proved unnecessary; cases treated medically that should have been operated upon, and cases justifying intervention that recovered rapidly without it. Yet the cases in which I have performed an unnecessary operation have been extremely few. The cases in which an unnecessary operation was performed had a fatal ending in but one. No cases occurred in which death followed delay excepting those desperate ones, to be considered below, in which the condition was such that the patient did not seem to have the least chance of recovering except by the unaided—shall I say the *unimpeded*—efforts of nature.

Some years ago I made the statement (AMERICAN JOURNAL OF THE MEDICAL SCIENCES, January, 1894) that the first symptoms of acute appendicitis were due to an extravasation from the appendix—an infection either gross and rapid, from the sudden giving way of the appendicular wall, or gradual, from an invasion of the peritoneum by diffusion—the result being a localized or a spreading peritonitis. Later experience has confirmed this view, though I have seen one or two sharp attacks of appendicitis in which there has been so little periappendicitis that I have been able immediately to close the wound. In cases of severe type, beginning violently, there is always a perforation of the appendix or a localized infection. Early intervention in the trivial cases would doubtless show an infection limited to the interior of the appendix, and permitting immediate closure of the wound.

From the above general considerations it seems not unreasonable to conclude that if any rule is to be laid down as to surgical intervention it should be that in the very beginning of the disease severe cases require operation, because there is always a perforation, a gangrene, or an extra-appendicular infection; mild cases justify it because there is little danger, and because the wound can be closed. The mild cases will recover whether operated upon or not, so that the benefit of operation will apply only to the severe cases. Appendicitis, unfortunately, does not even now always come under observation in the earliest hours. The surgeon often sees the case for the first time on the second, third, or fourth day, at a time when, it seems to me, the wisdom of universal intervention must be seriously questioned.

After the first twenty-four hours of an attack operation is advisable if the symptoms are severe, and especially if they are increasing in severity. At this time, if the attack continues in its original gravity, it may be concluded almost invariably that an escape of infectious material from the appendix has taken place, and that there is at least a localized peritonitis. Intervention at this time will show a swollen appendix, changed in consistence and in color, with patches of local necrosis, or even totally necrotic. The contiguous parts, whether meso-appendix, omentum, cæcum, small intestine, or iliac fossa, will be covered by an exudate and adherent to each other by easily separated finely granular adhesions. At this period, though there may be feeble barriers against speedy infection, all operations necessarily involve the peritoneal cavity. There may be an actual hole in the appendix, even now, through which, varying in amount with the seat of the perforation and with the liquidity of the cæcal contents, intestinal or appendicular contents may be escaping. The appendix may, on the other hand, be perfectly intact even with severe symptoms, these symptoms depending upon absorption from the mucous membrane of the appendix itself. Such a condition, however, is, in my experience, extremely rare. As I say, once or twice only have I felt justified in closing the abdomen after the removal of such an appendix.

The peritoneal cavity at the time always contains free fluid—sometimes clear, sometimes turbid, sometimes foul, according to the extent and nature of the infection. This fluid, if sterile, is a most efficient culture medium, and it cannot but be infected in all operations upon the gangrenous or perforated appendix. Notwithstanding this danger the abdomen should be opened, as a rule, even on the second day if the symptoms are severe, and especially if they are increasing in severity, because of the liability of these fluids to become contaminated in spite of spontaneous efforts at localization. Symptoms at this stage are severe if pain continues unabated, with fever, right-sided rigidity, and tenderness, especially if there is vomiting and distention. The constitutional signs are less important than the local, for in some infections, even if they are general, the pulse and temperature may be but slightly affected.

Indeed, constitutional symptoms greatly outweighing the local should excite the most careful consideration when appendicitis is suspected, for the former may be merely the expression of an acute absorption from the gastro-intestinal tract, the local signs being perhaps only a painful colic, affecting for the time the right rather than the left side of the abdomen. On the other hand, pain that has made its way to the region of the appendix, that remains there, that is accompanied by extreme muscular rigidity and tenderness, even without fever, should excite apprehension and raise the question of intervention. With tumor and with fever these symptoms require operation, unless there is rapid and unmistakable amelioration; they demand it if there is constant vomiting and beginning distention, even if some of the symptoms show signs of improvement.

On the whole, one seldom errs by operating in cases of severity at this time. The barriers against spreading infection cannot be relied upon—their existence even cannot be assumed. A serous exudate is at hand, ready to receive, multiply, and transport micro-organisms to the furthest recesses of the peritoneum.

In doubtful cases an unnecessary operation may be avoided by a blood-count made at this time. A leucocytosis often adds the necessary evidence upon which to decide in favor of operation.

From 100 cases of appendicitis at the Massachusetts General Hospital Dr. R. B. Greenough has drawn the following conclusions in regard to the relation of leucocytosis to appendicitis. The paper is to be published later by Dr. Greenough:

1. Leucocytosis may be considered to be a fairly constant symptom of appendicitis.

2. The presence or absence of leucocytosis, or the degree of leucocytosis, without other data, is not sufficient to determine the local condition of the appendix and its surroundings.

3. In a series of cases the degree of leucocytosis corresponds roughly with the degree of temperature, but in individual cases great variations are found.

4. The degree of leucocytosis, when considered in connection with the duration of the attack, is of considerable assistance in the diagnosis of the local condition.

5. A high leucocytosis (above 20,000) on the first or second day of disease suggests general peritonitis.

6. A low blood-count (below 10,000) after the first week, if accompanied by severe symptoms, indicates general peritonitis, and is of grave prognostic significance; but if accompanied by mild symptoms, denotes a mild catarrhal process or well walled-off abscess which has become subacute in character.

7. A high leucocytosis (above 20,000) after the first week or ten days may be taken to indicate a local abscess.

The symptoms in a severe and fully developed case of appendicitis may include pain, tenderness, rigidity, tumor, distention, constitutional disturbances, vomiting, and constipation. The time at which these symptoms appear may vary considerably. Some occur at the very earliest manifestation of the lesion, and persist; others appear early and subside early. Some are never observed. The symptoms seen at that critical period in which so many perish—the third, fourth, and fifth days—require careful consideration. What are they, and what weight shall we give them? No one symptom establishes the diagnosis, though several alone may suggest it. They need not all be severe to demand operation, and some may even be wanting. As I have observed them, all are important; but some have more significance than others.

The significance may vary, too, with the stage at which the symptom appears. Considered in detail from their inception to the full severity of the attack—from the beginning up to and through the third, fourth, and fifth days—the prominent symptoms of appendicitis are as follows:

Pain is the earliest, most urgent, most important, most easily misinterpreted sign. Sharp and intermittent, it suggests and is probably caused by the passage of gas or feces by the inflamed areas about the ileocæcal valve; dull and continuous, it indicates the presence of a localized peritonitis. Pain is to a certain extent the measure in breadth and depth of the infection. When pain is localized, after the initial stage, it means a local infection; when general, a general one. General pain at the onset of appendicitis becomes local as the infection becomes restrained, though the infection may be general while the pain is yet local. As the infection spreads, so does the pain. Sudden, sharp pain after temporary subsidence means a sudden increase in the affected area, and at times is ominous of general peritonitis. If pain is severe and increasing in severity, operation is demanded by this symptom alone.

Rigidity becomes right-sided soon after the localization of the infection. Though it may be difficult to estimate a general rigidity, bearing in mind the great tension of abdominal muscles sometimes seen in health, a one-sided rigidity can hardly be mistaken. It is often enough to mask a tumor that under the relaxation of anæsthesia is conspicuous. Rigidity is a symptom of great value in appendicitis. It means but one thing—involuntary protection of underlying structures. It does not follow, however, that the underlying peritoneum has been invaded by micro-organisms, for simple intestinal colics may cause rigidity.

Combined with other symptoms, this one possesses a significance of great value. Rigidity with distinctly localized pain in the right lower quadrant strongly suggests appendicitis; with fever, it almost proves it; with tumor, it fully establishes the diagnosis. Rigidity is a symptom rather of onset than of fully established appendicitis, for, as the disease becomes firmly shut off, the tension diminishes. In a few days the right abdomen, in localized abscesses, for example, becomes soft and the outlines of the tumor become easily perceptible.

Rigidity is important in helping to prove an underlying infection. Its prominence and early recognition make variations in its extent easily perceptible. It is therefore a conspicuous sign in estimating the rapidity and extent of spreading infections.

The value of tenderness, too, is great, though this symptom may be the expression of caprice or of imagination. Tenderness that is elicited only by deep pressure should be given little weight. Few cases of appendicitis demand immediate operation when tenderness requires careful examination for its detection. Tenderness in severe cases is usually exquisite; its manifestations almost ocular. Yet even when unmistakably great, I have seen this symptom disappear so rapidly that I have almost suspected its previous existence. In many chronic abdominal cases, and especially in neurasthenics, I have found no peritonitis whatever to account for this tenderness. In the neurotic, the imaginative, the pathophobic, the symptom should be carefully scanned, especially if unassociated with rigidity, tumor or fever. In connection with these signs, it is, however, significant.

On the other hand, the absence of tenderness may be misleading. I have seen serious lesions of the appendix in which neither rigidity, tumor, nor tenderness was prominent, the diagnosis resting chiefly on localized pain, fever, and leucocytosis. It may be asserted, however, that, as a rule, when there is no tenderness there is no rigidity. A tumor without rigidity or tenderness suggests rather a chronic process than an acute one—a lesion that may and should be studied and watched —one that too often proves to be tubercular or malignant.

As an indication of spreading infection, tenderness ranks with pain and rigidity. If these symptoms are increasing in extent the infection is spreading, when, it is needless to say, immediate intervention is required.

The tumor of appendicitis is perhaps a better guide to treatment than any other one sign, for upon its situation and extent more than upon any one thing depends the probable efficacy of intervention. Localized infection situated in one place will have a small mortality after operation; situated in another, a large. The mortality under operation will depend upon the feasibility of performing that operation without causing a general infection. A tumor to the right or behind the cæcum will permit easy isolation of the operative field; to the left or below, will not. Pelvic and central tumors, especially of large extent, cannot be securely isolated during the manipulations of operation. In separating the adhesions about such tumors it is practically impossible to prevent the spreading of infected fluid over the entire peritoneum, and general infection cannot but occur. Success after such operation is rather a matter of chance than of expectation—a question rather of the nature of the micro-organism present than of the manipulative dexterity of the surgeon. In one case the contents of a large abscess may be freed among the small intestines—stirred in among them, as it were—and the peritoneum will take care of the micro-organisms and their products; in another, a single spot of exudate will infect the whole peritoneum. In the one case a mild and perhaps attenuated bacterium will be rapidly overcome, and in the other an active and virulent one will implant and reproduce itself throughout the abdominal cavity.

The size and consistency of the tumor vary greatly. In the early days the actual tumor is masked by what has been called the cake, which is a combination of tumor, rigidity, and tenderness—the tenderness masking the rigidity, and the rigidity the tumor. Under ether the hard cake may dwindle into an insignificant tumor. For this reason it is difficult to estimate in the first few days the extent of a limited peritonitis. I have often been surprised by the rapid disappearance of a large tumor after subsidence of tenderness and rigidity.

The significance of tumor is great, even if its exact extent is masked. It adds a sign to a suspected appendicitis that is unmistakable. Barring such lesions as intussusception or tuberculosis with tumor at the ileo-cæcal valve, acute abdominal symptoms attended by tumor in the ordinary situations of the appendix are practically sure to be appendicular in their origin.

Too much significance should not be given to the absence of tumor when other symptoms are severe, for it may be so deeply placed as to escape detection.

Vomiting, distention, constipation, though symptoms possessing, as a rule, grave significance, should not be regarded as necessarily the result of a general infection, for occasionally it will be found that their cause is functional rather than organic; reflex rather than mechanical. Associated with general pain and tenderness, even if with no other sign, these symptoms mean a general infection. They may by themselves mean nothing but a transitory gastro-intestinal disturbance, and operation undertaken with no confirming signs may lead to disaster.

If, however, after the early hours of a suspected appendicitis there are vomiting, distention, and constipation, no combination of symptoms is more urgent. Intervention must be the rule, even if everything seems unfavorable, for signs that in the progress of a local infection point even with uncertainty toward a general one have a significance that must not be disregarded.

The kind of vomitus and the way in which it is vomited are of importance. Easy and constant regurgitation, for example, is more serious than occasional violent retching; dark-colored vomitus more serious than biliary. The value of the single symptom vomiting depends somewhat upon idiosyncrasy, as some patients vomit persistently after simple anæsthesia, and others do not vomit even with a fulminating peritonitis.

The importance of constipation depends upon its cause. This symptom, if caused by mechanical obstruction, is attended by loud gurgling. If no intestinal sounds can be heard, general peritonitis with intestinal stasis is to be feared. In simple inaction there are occasional intestinal sounds. It must be borne in mind that diarrhœa sometimes is present even in general peritonitis.

The temperature varies extremely in intensity. It may be normal, it may go to 105°. In a general way low temperature indicates the presence of the colon bacillus; high, that of the streptococcus. I have seen a normal temperature when there was a hopeless general infection; a high one when only the denuded inner layer of the appendix was absorbing. Very high temperatures often subside as quickly as they appear; they are rarely persistent. A continued temperature of 101° to 103°, or a temperature rising by degrees from 100° to 103°, with other signs of infection, local or general, demands intervention, or at least strong reasons for non-intervention.

Taken by itself, the temperature does not justify laparotomy unless the diagnosis is positive, though it may add the necessary evidence in cases otherwise doubtful.

Temperature without local physical sign; temperature with pain alone, if used as a guide, will often prove a false one, and may lead the surgeon into error.

The pulse is of value in connection with the temperature as an index of operative necessity. When high and of poor quality the pulse shows perhaps more than any one sign the depth of the constitutional depression. Such a pulse may be the result of a constitutional absorption from a relatively small area—in which case the signs will be those of a local rather than of a general peritoneal infection. It will, therefore, indicate operation when perhaps the other signs may seem favorable for delay. I have observed time and again the pulse of grave toxæmia attending an absurdly inadequate local lesion—a pulse which, it seemed, would hardly persist through a brief operation, and one which would quickly succumb to the increased absorption of fresh areas unavoidably opened to fresh infections.

On the other hand, the most alarming forms of appendicitis may exist without sensible deterioration of pulse. I have, for example, based a diagnosis of mechanical intestinal obstruction upon a normal pulse and temperature, and found on exploration a hopeless general peritonitis. As a rule, however, the pulse and temperature have their usual significance, that of indicating, on the whole, in conjunction with the history and local signs, the extent of the infection.

The temperature-curve of three or four days is of value in determining our course when from other aspects of the case there is reason to dread the results of operation. A fall in pulse and temperature, with subsidence, or even without subsidence, of local signs indicates the possibility of awaiting a more favorable time for intervention; with signs of existing or threatening general infection a favorable pulse and temperature make less gloomy the prognosis of intervention.

Certain other symptoms of appendicitis might be considered, but as they are symptoms rather of general peritonitis they need no special mention here.

When seen for the first time on the third, fourth, or fifth days the general trend of the case may be more or less accurately determined. There is either general infection or there is not; there is either impending disaster or there is not; there is either marked improvement or there is not. Is it not fair to question at this time those rules of procedure which require in every case exactly the same line of treatment? May we not at least assume that some of those cases will recover without operation, and that some will die with it, and, admitting human fallibility, may we not by applying a universal rule turn the scale against the very patient who would have escaped by other methods of treatment? I am firmly convinced that by operating we at times do turn the scale against the patient; and, I admit, that by not operating we may at times withhold his only chance. It is at this critical period, therefore, that intelligent discrimination should be encouraged; that each case should be considered as a case by itself; that no sweeping rule of procedure should be advocated.

After the first forty-eight hours the conditions found at operation differ materially from those of the earlier hours. Necrosis has been fully established, localization has become successful, or infection has become general. The appendix will be found embedded in recent adhesions; contiguous to it, surrounding it, or in some way connected with it, will be found a foul-smelling liquid exudate teeming with bacteria. This exudate will vary in its localization between wide limits of peritoneum. It may be far to the right, behind the cæcum; it may be high up, involving liver and kidney; it may fill the pelvis or cover the bladder; it may be buried among small intestines; it may be directly under the skin; it may appear even in the left lower quadrant of the abdomen.

The peritoneal cavity will often be found filled with sterile serum, firmly separated from the infection focus. Too often it will be found already extensively infected. The appendix itself will present all varieties of necrosis from small gray areas to total gangrene. Even at this stage there may be no definite perforation, though generally one will be found. The meso-appendix will itself often show a total necrosis, and the contiguous viscera will be covered with a gray exudate—pseudo-necrosis. The probable situation at this time can be determined by the experienced operator, and, I may add, the probable outcome of operation, as well as the probable result of delay.

Unfortunately, in the fatal days of appendicitis—the third, fourth, and fifth day, or even later—the results of operative treatment are still deplorable. Can we not often tide a patient over those critical days to a time when intervention is almost surely successful—when the danger will be that of simple abscess-drainage or of an intermediate operation? Is it not wise conservatism, when the case is severe and of a type that is usually fatal after operation, and when there are signs of improvement, to await (always excepting cases of general peritonitis) a more favorable time for intervention? It seems to me that the answer must be affirmative.

Although central localizations of septic fluid about a presumably gangrenous appendix cannot be interfered with in these early days of appendicitis without grave danger of causing general peritonitis, this danger, grave though it may be, must be deliberately encountered:

1. If the symptoms are becoming more severe, and especially if there is any evidence that a sudden extension has taken place.

2. If the patient is dangerously septic, as shown by pulse, temperature, and circulation.

3. If, though there is no increase in the symptoms, they are still severe.

Surgical intervention in this particularly dangerous class should be postponed, however, if the symptoms show signs of improvement.

This opinion is based upon the large mortality following operation—a mortality due to the unavoidable spreading of infectious material among intestines that cannot be guarded. As I have already said in connection with special symptoms, intestines cannot be guarded from infection, because the limiting adhesions are so fragile that they give way, if not immediately on opening the abdomen, the moment attempts at walling are made. At the very beginning, therefore, of operation the abdominal cavity cannot escape immediate flooding in spite of all efforts to prevent this accident. Even later, when it is generally possible to arrange gauze barriers and to separate deliberately the adhesions about the appendix, an inopportune rupture will hazard the success of the operation. Not that such accidents are invariably fatal—they are often harmless; still, they cannot but be regarded as the most serious of complications. If it is said that the peritoneum can be relied upon to take care of large quantities of fluid saturated with living and virulent micro-organisms, my reply is that such an expectation is contrary to common sense and to general experience. Were such powers possessed by the peritoneum, well might we question the necessity for the elaborate details of aseptic surgery. Indeed, if the peritoneum can absorb, without damage to itself or to the system, not drops or particles of poison, but pints or even quarts, it may again be a question how it happens that peritonitis can occur at all.

I cannot but repeat, therefore, what I have said many times before, that the argument against separation of adhesions and the resulting unavoidable contamination carries the greatest weight, and that, dangerous though it may be, delay in cases that are improving is fully justifiable.

The chief argument in favor of operating upon cases of the class that are improving lies in the possibility of sudden rupture. But in carefully watched cases this rare accident can be immediately recognized, and, after all, it is but the spontaneous occurrence of what the operation deliberately causes. The chief advantage is that the extravasation has a short time in which to spread before cleansing can be attempted. A sure contamination must be balanced against a possible one. The chances favor the policy of non-intervention. Furthermore, if symptoms increase in severity, without rupture, the chances from operation grow better instead of worse, because the prevention of infection becomes the easier the more practicable the isolation of the operative field. Moreover, is it not possible that the fluids lose their potency as time goes by? The fluids of the early hours seem to have an activity and virulence which those of the later stages lack. Indeed, fluids long confined are often sterile.

From the above considerations it seems not unreasonable to conclude that in severe attacks of appendicitis attended by large collections of fluids successfully localized operation should be postponed for a time if there are signs of improvement, and more especially if the fluids are localized centrally or in the pelvis.

Another class, by no means small, comprises those cases in which the chances are in the balance, the slightest aggressive treatment being sufficient to turn unfavorably the scale. The usual termination of such cases is death, but occasionally recovery takes place—sometimes with operation, sometimes without. The proper treatment in this formidable class is perhaps more a matter of theory than of fact, of speculation than of demonstration. The fatalities in such cases always raise the query whether the other line of treatment would not have been better. Indeed, it is but natural, after failure, to wish that some other course had been pursued.

On the whole, however, it seems reasonably clear that patients usually are better treated medically when it is reasonably evident that the slightest shock may turn the scale. The principle is the same as that in shock after extreme violence. He would be a rash surgeon who would amputate a limb during profound shock. The better course would be to wait for its subsidence—for a pulse that could at least be felt. So in the profound shock of peritoneal absorption, except that in the latter reaction is less likely to take place. There is perhaps a difference in the significance of shock, according to the period at which it occurs. The initial manifestations of peritoneal contamination are quite another thing from those of fully developed toxæmia, though these two may seem very much alike. The shock, for instance, of invasion is sudden and severe; it affects chiefly the pulse. The temperature may be depressed. In fully developed toxæmia the signs are rather those of approaching death, of cold extremities, lividity, high pulse and high temperature. In the one there is the expectation of reaction; in the other of certain death.

The difficulties in the way of settling the question of intervention in cases of great severity seem to me extreme, and I offer my opinion with much diffidence. It would be so much easier to apply a hard-and-fast rule. I for one, however, cannot subscribe to an invariable rule of procedure at any stage of appendicitis, and especially at that stage when, from the above considerations, there is reason to believe that surgical intervention increases the hazard, already great.

II. Should the appendix be removed in every case?

Many of the reasons for not operating in a case of acute appendicitis apply in considering the advisability of removing the appendix in every case that is treated surgically.

It is assumed that at some time or other, in the absence of distinct contraindications, such as unsuitable conditions of age, temperament, general, or local disease and the like, a diseased appendix should be removed. The question is as to the most advantageous time, all things considered.

The best time for the removal of the appendix is in the period of perfect health, or as near that period as possible. When attacks follow each other frequently, at intervals of a few weeks, we must take the chances of slight local sepsis, for fear of another attack and possibly a more severe infection. When the abdominal cavity is opened in the course of an acute appendicitis the appendix should be removed almost invariably, because the manipulations for drainage are little, if any, less dangerous than those for complete appendectomy. Yet the patient's bad condition and failing pulse occasionally forbid removal of the appendix, even when the field is fully exposed.

Removal of the appendix is, in my judgment, contraindicated when there exists an abscess that can be drained through a small incision in the abdominal wall.

There are exceptions to this rule. When the abscess is one-sided, when the strength is good, and when the general peritoneal cavity can be well isolated, the appendix may be sought for and removed. In all such cases Harrington's method of gauze-walling between abscess and abdomen affords abundant protection, even in prolonged manipulations. This method I have found so good that in the last eighty-seven operations simple drainage has been used but five times. True, many of these were not right-sided collections, and the appendix, for other reasons, was removed in spite of the danger; but the general trend of my work is toward the removal of the appendix, and cases of simple drainage are becoming more and more infrequent.

Another reason for not searching for the appendix in abscesses of long standing—*i. e.*, with firm walls—is that the appendix is sometimes totally exfoliated. In early cases I have often found a total gangrene, sometimes involving meso-appendix as well as appendix. Such appendices retain their shape, and are often firm, though necrotic. In late abscesses the pus evacuated will sometimes float out a slough, with or without concretions. This slough should be carefully examined, for it may be shown to be the appendix.

If it were necessary to break up adhesions for the sake of thorough drainage removal of the appendix should then, of course, be the rule; but this procedure seems to me totally unjustifiable in the vast majority of cases, for as an almost invariable rule there is but one abscess cavity. Should another develop, a thing which I have seldom seen, that may be drained through the wound of the first, or wherever it may present itself. Some abscesses work through the abdominal wall and point under the skin. Drainage under cocaine is enough to cure such cases. Searching for the appendix at such a time seems absurd. When pus points in the posterior cul-de-sac or in the rectum it should be evacuated there, unless it can be drained through the abdominal wall without risk of general infection; the appendix should be removed after convalescence. In fact, these deeply seated pelvic collections are almost precisely like pelvic abscess from salpingitis, and the reasons for intervention are similar. No form of surgical disease of the abdomen may be more formidable than are the large collections of pus filling the pelvis and overlain by free coils of intestine. Operation through the abdomen in the acute stage of these large tubal abscesses has an excessive mortality. Delay with or without vaginal drainage offers two advantages—one that of decreasing virulence in the micro-organisms, the other that of decrease in the size of the tube. Occasionally, it is true, intervention cannot be postponed, and, risk or no risk, the abdomen must be opened and drained up among and by the intestinal coils. I cannot but feel oppressed, however, by the gravity of such a condition in salpingitis, and whenever I have been able to drain through the vagina or await a time more favorable for intervention I have been rewarded by recovery. So in pelvic abscesses of appendicular origin, separation of adhesions and drainage upward for the sake of removing the appendix have an excessive mortality; on the other hand, by drainage through the vagina or rectum a patient almost moribund may be tided along to a time when the appendix may be safely removed.

That the appendix should not be sought for when the patient's condition is ominous of speedy death is, of course, obvious. If the appendix can be removed in a few seconds, or even in a few minutes, it may be done, even when the patient's general condition forbids prolonged search. When, however, the appendix cannot be immediately seen or felt, when, for example, broad areas of omentum must be detached, the wound enlarged, the intestines overhauled—when, in a word, search to be successful must be prolonged and extensive—it seems clear that to remove the appendix is bad judgment, a loss of the sense of proportion of things—a choice of the greater, not the lesser evil.

If in certain acute cases we decide that operation is not best—that in operations upon certain other acute cases removal of the appendix is unwise—it remains to consider what remedy, if any, we shall apply to prevent that dreaded recurrence which in so large a proportion of cases must be predicted. Leaving out of the present consideration those mild cases which justify operation perhaps more from disability than from danger of life—although it is impossible, of course, to say that after repeated attacks of a trivial nature a severe one may not ensue—and confining the discussion to those cases in which, after postponing operation, the patient has made a good recovery, it seems clear to me that in all cases, in the absence of contraindications, a deliberate operation should be undertaken in the period of health.

This opinion is based upon the frequence of recurrence after attacks attended by localized peritonitis and after the drainage of abscesses.

In a large proportion of cases of acute appendicitis a second attack must be expected, even if there has been a localized peritonitis of considerable extent. If the original disease started as a perforation near the cæcum recurrence is more likely than if the perforation were elsewhere.

Though many operations after recovery from even the severest attacks of appendicitis fail to show material lesions in the appendix, most explorations demonstrate unmistakably the septic nature of the previous process. In many instances cheesy masses will be found about a thickened appendix, the whole buried in firm adhesions. Such evidences of previous inflammation, the impossibility of knowing how persistent the previous sepsis in a given case may be, and consequently whether or not temporary drainage may be necessary—these considerations lead to a postponement of operation for some weeks after subsidence of all signs of the acute attack. Neglect of such a course—a too early operation after recovery, with closure of the wound without drainage—has led, I believe, to the few disasters that have followed operation in the interval. Such cases really are not operated on in the interval, for they are rather to be classed as subacute. In 238 operations performed in supposed perfect health I have drained for twenty-four to forty-eight hours in a large number, and have lost none. I feel confident, therefore, that closure of the wound adds great risk in conditions of doubtful asepsis. A persistent sinus is very suggestive of an opening directly into the appendix. I have removed several appendices that showed this condition. In one case a sinus in the right lumbar region communicated with the tip of an appendix in the iliac fossa, the tip being the only part shut off from the peritoneal cavity. In another instance the sinus opened into the central part of the appendix. Removal of the appendix, sinus, and scar in one piece permitted immediate closure of the wound.

The results of secondary operations after the recovery from simple drainage have been among the most brilliant and satisfactory of our interval operations. Every case has recovered, not only from the operation but from the hernia, if one existed, and from all pains and discomforts. I believe that after drainage, unless there is good reason to believe that the appendix has entirely sloughed away, and even then if there is a hernia the operation of appendectomy should be completed. Like certain other operations—intracranial neurectomies, for instance, and the removal of brain tumors—at times the safety of the patient demands that the danger be divided between two operations. In such cases the second makes the completed operation. This course, eminently wise under certain conditions, and made imperative by the great risks that at least some of us see attending the so-called completed operation for appendicitis, renders the treatment of large appendicular abscesses particularly gratifying. Such advantages as attend the incomplete operation are fully remedied by the completed, and, what is most to be desired, there is little danger in either. The combined dangers of the operation completed at one sitting vastly outweigh the dangers when performed in two. Finally, by the two-stage operation, hernia and other weaknesses of the abdominal wall are remedied as effectually as is possible.

A glance at the total number of cases of appendicitis which I have personally observed may not be inopportune. The fatal cases should receive particular emphasis, for it is by studying them that we can get nearer the truth than by confining ourselves to the more pleasing list of recoveries. The total number of cases in which the diagnosis of appendicitis was made is something over nine hundred. If each observation were reported the number of cases would be considerably greater, for many of them were seen at the acute stage, and should be so recorded; these same patients were operated upon at a later date, and have been thus recorded. By appearing in each list the number of observations would thereby be increased, the same patient appearing in separate lists.

The figures are not absolutely correct, because the records have not been exhaustively searched. It is safe to say, however, that the fatal cases are all included, because they have been conspicuous. Among them have been placed several deaths as following operations that a more rigid censorship might fairly have excluded from the list of operative deaths. For instance, one case died before operation was begun, another died by his own hand while convalescing, twenty-one died within twenty-four hours; many hardly recovered from the ether; several had simple abdominal incision under cocaine. Though these cases might be eliminated from a discussion of the relative merits of medical and of surgical treatment, and might be used, therefore, to explain or even to reduce my mortality, yet they must be reported not only because they were fatal, but because they all throw some light upon the questions here considered. Twenty-one deaths, for example, within twenty-four hours from the time of operation is an important experience, and an eloquent argument against the wisdom of operating *in extremis*, though it is a persuasive one in favor of earlier intervention.

The most significant cases in the following table are the acute ones which recovered without operation (158). This group includes those in which operation was deferred, because it seemed more dangerous to intervene than to delay. It includes also some which were apparently hopeless and moribund. The thirty-one acute cases that died unoperated upon were moribund or refused operation.

Acute cases, operation, recovery	259
Acute cases, operation, death	72
Acute cases, no operation, recovery	158
Acute cases, no operation, death	31
Interval operation, all recovered	238
Chronic cases declining operation	109
Other diseases simulating appendicitis	37
Total	904
Of 259 operations in acute cases—	
Appendix removed in	154
Abscess drained in	105
But since January, 1898, of 87 operations in acute cases—	
Appendix removed in	82
Abscess drained in	5

Total operations, 569; mortality, 12.6 per cent.
Total acute operations, 331; mortality, 21.7 per cent.
Total interval operations, 238; mortality, none.

The statistics of operations for appendicitis are misleading. The mortality after operations in acute cases, as given above, would have been enormously reduced by operating upon all the cases as soon as the diagnosis was made, because practically all the mild cases would have recovered. Not as many, however, as did actually recover after an operation in the period of health; for it is unreasonable to conclude that operations performed under conditions of even slight sepsis are as successful as those under none at all. Those cases that I have seen in which the patient was profoundly septic, with general peritonitis, have all died, whoever the operator or whatever his method. It seems to me idle to contend that such cases can be saved except by a miracle; and I cannot but believe that those who have a small mortality in acute appendicitis meet a small number of such cases.

The rule that needs to be constantly repeated is the one that calls for the surgeon early in the disease. It cannot be repeated too often. The rule that requires an invariable course of procedure in appendicitis, without regard to the special aspects of the case, to the constitutional peculiarities of the patient, to his surroundings, to the fitness and experience of the operator, is, it seems to me, a rule which is justified by neither facts, theories, nor arguments.

THE PATHOLOGY OF PARALYSIS AGITANS,

WITH THE CLINICAL HISTORY AND AUTOPSICAL NOTES OF A TYPICAL CASE WITHOUT TREMOR.

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The first contribution to the pathology of paralysis agitans was made by Parkinson, of London, in an essay published in 1817. So accurate was Parkinson's description of the clinical symptoms of this disease

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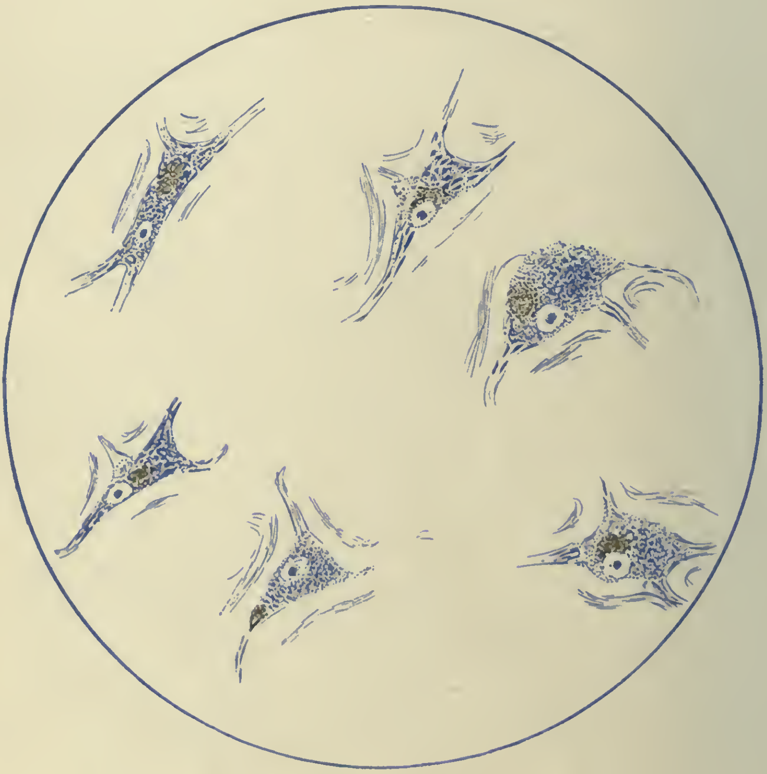

Multipolar Nerve-cells from Anterior Horn of Lumbar Cord.
Dr. Gordinier's Case of Paralysis Agitans.

Free-hand drawing from microscope. Zeiss $^{1}/_{12}$ apochromatic.

that nothing essentially new has been added since. He found at the autopsy of one case a hardening of the pons, medulla, and cervical part of the spinal cord. Since the publication of Parkinson's essay I have been able to collect from literature fifty-three cases of paralysis agitans with autopsies. Of this number but twenty-four cases have been examined by modern microscopical methods, and hence are of scientific value in determining the exact anatomical changes incident to this disease. Despite the frequent occurrence of this disease in America, but three cases with autopsies have been recorded.[1]

AUTHOR'S CASE.—*December* 20, 1894. Miss A. C., aged fifty-five years, American by birth; has never been ill since childhood. Her father died when she was but four years old, the cause of his death being unknown. Mother died of tuberculosis. Has two brothers living and in perfect health. One sister dead, cause unknown. No neurotic history. Syphilis denied. She has never had an injury, nor suffered from sudden shock, fright, or grief. She can give no definite idea of the causation of her disease, which began three years ago with a gradually increasing stiffness of the muscles of the arms, neck, and back. This stiffness was soon followed by a bending forward of the head, neck, and trunk, which, together with a flexion of the arms at the elbows, resulted in an attitude quite typical of Parkinson's disease. She complains of rheumatoid pains in the arms and legs, and frequently suffers from numbness of the fingers and toes. She never has headache. States that when she attempts to walk, unless she is extremely careful, her progression becomes so rapid that she falls. If she loses her balance she frequently runs backward, and then falls. She never has had tremor in the legs, hands, tongue, lips, facial muscles, or head. In summer she sweats profusely, and in winter much more than is normal. Has perfect control over bladder and rectum. Has had no menstrual epoch in ten years.

Status Præsens. Patient is rather short and stout. Her carriage is typical of Parkinson's disease. She appears very stiff and rigid, and the head, neck, and chest are flexed forward. There is a decided lateral curvature of the spine involving the lower cervical and upper dorsal regions, the convexity being toward the right side. The forearms are flexed upon the arms and the hands held in the writing position. The contracted muscles were with difficulty overcome, and such efforts excited much pain. Propulsion and retropulsion were very marked. Slight lateropulsion was present. The voice was high-pitched and piping. She was unable to rise without assistance from the recumbent or sitting posture. She could not ascend nor descend stairs. When once on her feet her movements were quick, and she progressed as if her upper extremities and trunk were one solid piece. There was no motor nor sensory paralysis. The cranial nerves are intact. The patella tendon reflexes are slightly exaggerated. No ankle clonus present. Superficial reflexes normal. No ulcerations, bullæ, nor sores of any description could be found. Thermal paræsthesia quite marked. Complains much of the heat, and is annoyed dreadfully by it in the summer. Mentally she is rather dull and her memory is defective.

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[1] Dana, New York Medical Journal, June 10, 1893, and James R. Hunt, Journal of Nervous and Mental Disease, 1896, p. 184.

Physical examination of heart and lungs showed nothing abnormal; liver and splenic dulness normal; urine negative; uterus atrophic; radial and temporal arteries do not appear thickened.

No particular change occurred in her symptoms during the two following years, save that she became gradually more helpless, and latterly was confined to her bed. No tremor ever developed. A careful search of the soft palate, uvula, epiglottis, and vocal cords elicited no vibration. In April, 1897 she succumbed to an attack of lobar pneumonia.

Autopsy, twelve hours after death. Height, four feet seven inches; slight build; general emaciation; no post-mortem rigidity; post-mortem staining over dependent parts. A large bed-sore, 7½ by 12 cm., existed over the lower dorsal and lumbar regions, while two smaller ones were found in close proximity, evidently in process of healing. Over each tuber ischii similar sores existed, also a number of perfectly circular white cicatrices distributed over hips and thighs.

Sectio Cadaveris. Panniculus adiposus very slight. Muscles of thorax wasted and of a pale red color. Right lung adherent at apex and over surface of middle lobe by tender adhesions. Right pleural space contained no free fluid. Right lung crepitates, save at base of lower lobe. Upper and middle lobe very œdematous; pus and serum exude from bronchi. Sections from all parts of lung float. Left lung adherent at apex. The interlobar fissure effaced by exudate; entire lower lobe of greater consistency than normal, does not crepitate, and presents on section a dark-red granular surface. It is very friable, and does not float. Lower part of pleural cavity effaced by recent adhesions. Pericardium normal, and no excess of pericardial fluid in sac. Heart normal in size, myocardium soft and flabby, of a pale red color; no interstitial myocarditis. Coronary arteries show beginning fatty degeneration. Ante-mortem clot in left ventricle. Left ventricular walls appeared thinner than normal. Aortic opening and valve normal. Slight atheroma at beginning of aorta. Mitral opening and valve normal. Left auricle very thin walled. Right ventricle contained a chicken-fat clot. Tricuspid opening and valve normal. Right ventricle and auricle normal. Liver slightly enlarged, evidently fatty. Kidneys normal in size, capsules non-adherent; normal relation between cortical substance and pyramids. Spleen soft and rather pale, size normal.

Nervous System. Calvarium very thin throughout, diploë slight. Skull is almost translucent over temporal regions. Meningeal vessels full of blood. Middle meningeal arteries appear thickened. Superior longitudinal sinus contained an ante-mortem clot, nearly colorless. Lateral and straight sinuses contained fluid blood. Dura appears a little thickened, but is nowhere adherent. Connected with the dura of the right side was found a small elevated tumor the size of a marrowfat pea. Pacchionian bodies seem atrophied. There was slight increase of subarachnoid fluid over convexities. The vessels of the pia were injected. Basilar artery and the branches composing the circle of Willis were not sclerosed. Pia is non-adherent and strips with no loss of brain substance, leaving an exceedingly pale cortex. The cerebral hemispheres appear perfectly symmetrical, the fissures in general are more shallow than normal. The ventricular cavities contain a slight excess of cerebro-spinal fluid. The choroid plexuses are deeply injected, but are not adherent to underlying basal ganglia. The distinction between the gray and white matter is very marked, the cortex throughout being thinner than normal. The white matter appears very pale, and the puncta vasculosa are not prominent. Sections through the basal ganglia and internal capsules show no macroscopical lesions. Cerebellum appears normal in size and shape, and on section no naked-eye changes are visible. The cranial nerves were all perfectly free and devoid of any gross changes. Trans-sections through the crura cerebri, pons varolii, and medulla oblongata appear normal.

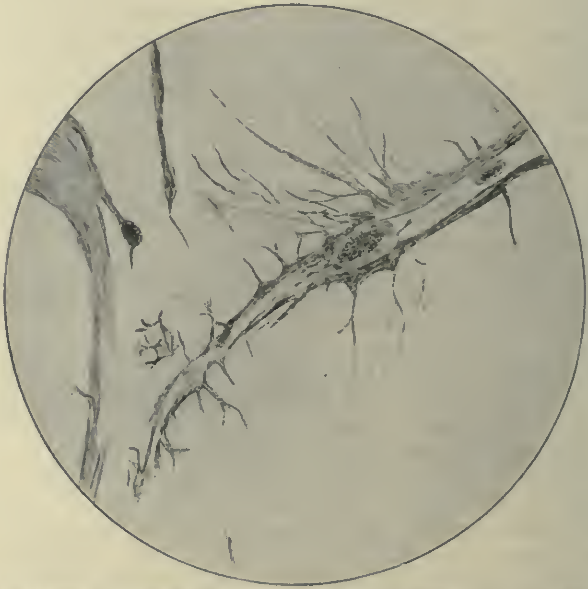
The spinal cord was removed in the usual manner. The membranes were normal in appearance. The vessels of the pia were prominently injected. The anterior and posterior median arteries were full of blood and appeared much firmer than normal. There was a slight increase of subarachnoid fluid. Numerous cubes were removed from various lobes of the brain and cerebellum, as well as several segments from different levels of the medulla and spinal cord for immediate study by the method of Nissl.

The remainder of the cerebro-spinal axis was hardened in Orth's fluid, and subsequently in Müller's fluid. The various histological parts of the cord were stained in the following manner. The neuroglia was studied after having been stained with Mallory's phospho-molybdic acid, hæmatoxylin, nigrosin, and Van Giesson's picric-acid fuschin and hæmatoxylin method. The myeline was stained after the method of Weigert and by Pal's modification of the same; also by the very excellent and more recent method of Marchi. The bloodvessels were stained with Van Giesson's picric-acid fuschin, the nuclei having been previously stained with alum hæmatoxylin and Ehrlich's triacid mixture. The nerve-cells were stained after the method of Nissl; also with carmine, hæmatoxylin, nigrosin, and safranin.

Microscopical Examination. Transverse sections of the cord through the sacral, dorsal, lumbar, and cervical regions show a symmetrical arrangement of the white and gray matter. The formation of the ventral, lateral, and dorsal cornua are alike on both sides. No evidence of congenital misarrangement (heteropia) was observed. The pia mater is universally thickened, and shows in its meshes a small round-cell infiltration. The bloodvessels of the pia are dilated and showed distinct proliferation of the media and intima, the ventral septum being very much thickened and containing in its meshes many round cells (Fig. 1). The dorsal neuroglia septum is likewise thickened. The bloodvessels throughout the cord are dilated (Fig. 2). Only a few show marked diminution of the calibre. Many of them present ampullar dilatations, with thickening of the media and intima. The capillaries throughout the gray and white matter are greatly increased in number (Figs. 3 and 4). The ventral cornua and intermediate gray matter contain a number of enlarged and tortuous capillaries, with distinct proliferation of the cells of the endothelial coat. Most of these capillary vessels are surrounded by enlarged perivascular spaces, some of which are empty, while others contain granular débris, together with escaped leucocytes. All the bloodvessels, large and small, are distended with corpuscles. About many of the vessels could be seen numerous migrated white corpuscles. Some were found undergoing diapedesis. No extensive blood extravasations were found in the gray matter.

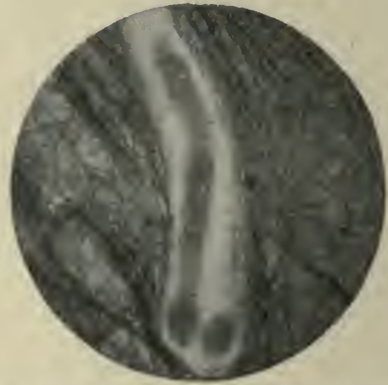
There is a marked proliferation of the neuroglia tissue throughout the cord (Fig. 5), this proliferation being most active in the lateral and dorsal columns. The subpial neuroglia layer (Rindenschicht of the Germans) surrounding the periphery of the cord is much increased in thickness (Fig. 6); the numerous neuroglia septa which are connected with this thickened subpial layer, and conduct the centripetal vessels to the gray and white matter, are evidently much hypertrophied (Fig. 7). These septa contain many proliferated neuroglia cells.

FIG. 1.



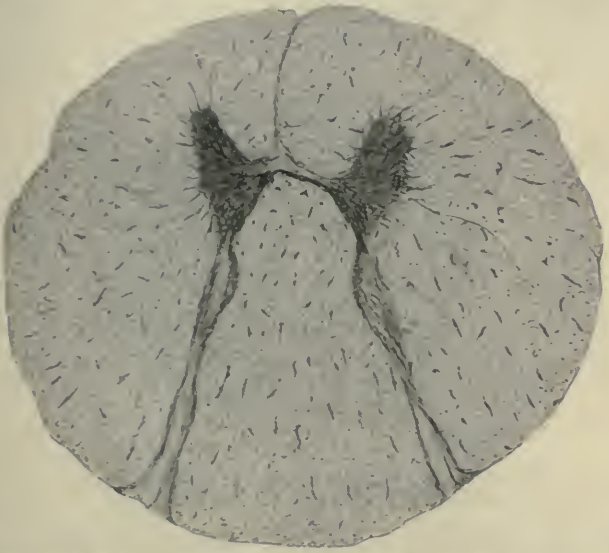
Thickened anterior median septum, showing two bloodvessels with thickened coats. (Zeiss 4 mm., ocular IV.)

FIG. 2.



Microphotograph showing dilated capillary from left anterior horn of midlumbar region.

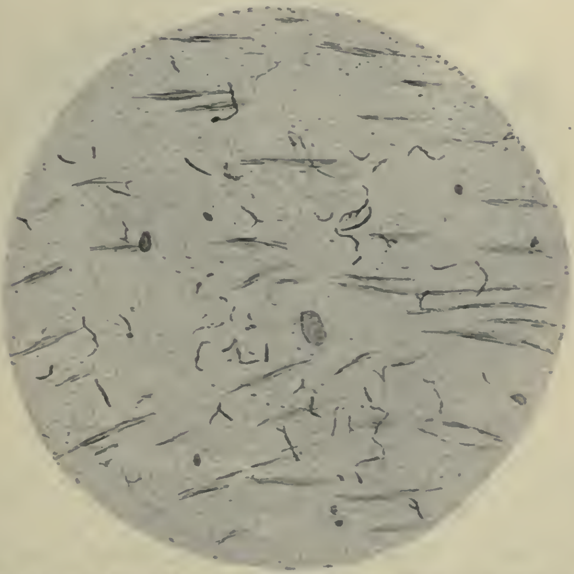
FIG. 3.



Dorsal cord, showing multiplication of capillary vessels. (Reichert ½ inch, ocular II.)

There is throughout the gray and white matter of the cord a universal round-cell infiltration. These round cells, after being differentiated with Ehrlich's triple stain, prove to be escaped leucocytes. The dilated central canal is obliterated, being filled throughout its entire extent with

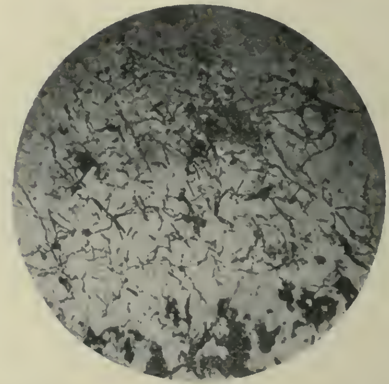
FIG. 4.



Increase of capillaries in the formatio reticularis grisea. (Reichert ¼ inch, ocular II.)

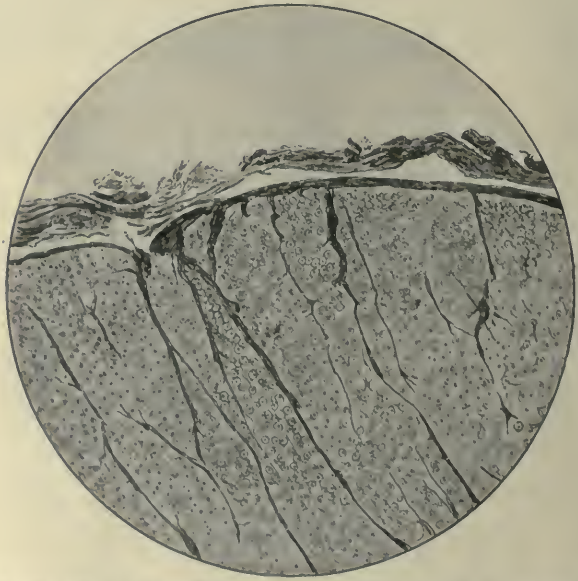
a granular débris and proliferated ependymal cells. All sections of the cord contain numerous corpora amylacea (Fig. 8). They are more abundant in the white matter of the posterior and lateral columns. They are found in less number in the gray matter, particularly of the dorsal cornua. These bodies give the characteristic reaction with iodine and sulphuric acid.

FIG. 5.



Microphotograph of anterior horn, showing numerous capillaries, increase of neuroglia, and a few ganglion cells. (Golgi's rapid method.)

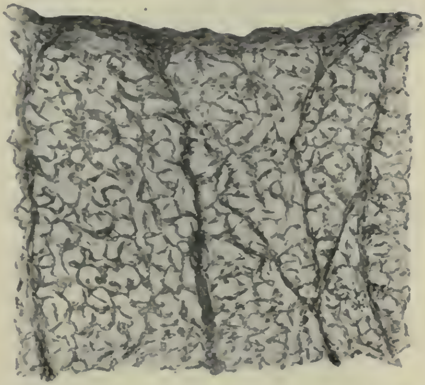
FIG. 6.



Part of the white matter of the lateral column, showing thickening of the subpial neuroglia layer, with numerous thickened neurogliar septa. (Reichert ¼ inch, ocular II.)

Many of the motor cells of the ventral and lateral cornua present degenerative changes. There is an excess of normal pigment, and many atrophic cells are present (Fig. 9). There is a general dilatation of the cellular lymph spaces. This degeneration of the motor cells exists throughout the whole extent of the cord, but is most marked in the upper lumbar, dorsal, and lower cervical regions. There was found no distinct degeneration of any system, bundle of fibres, or any tracts of association.

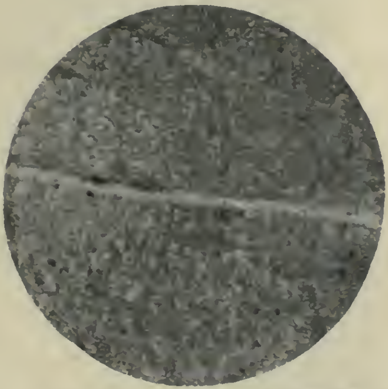
FIG. 7.



Thickened neurogliar septa and general increase of neuroglia, from a part of the posterior columns. (Reichert ¼ inch, ocular II.)

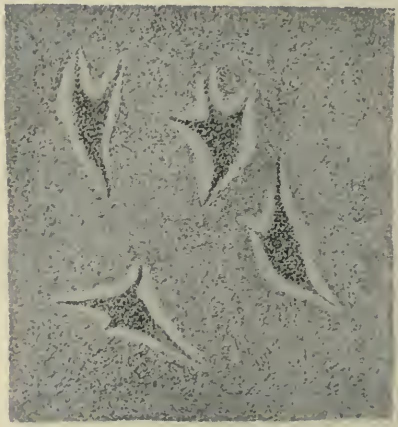
After studying many sections of the cord stained after Pal's modification of Weigert's method, no degeneration or diminution in numbers of the ventral intracornual nerve-plexus could be discovered. These sections were all compared with sections from the normal cords stained in the same manner. In all sections a distinct perivascular degeneration was found, which surrounded all bloodvessels of medium and large size. These perivascular areas of degeneration appeared to be due to a prolif-

FIG. 8.



Microphotograph of a part of the dorsal columns containing corpora amylacea.

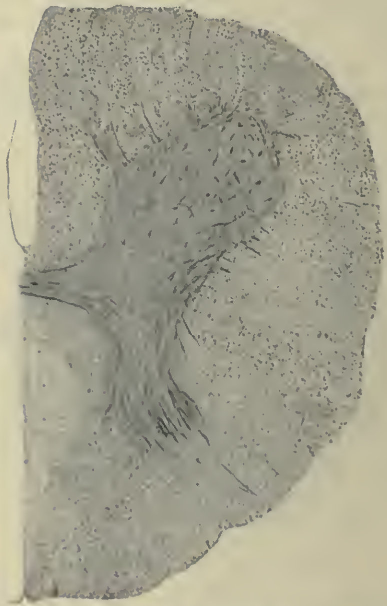
FIG. 9.



Four anterior horn-cells resting in dilated pericellular spaces and containing large amounts of pigment. (Nissl method.)

eration of the neuroglia connected with or adjacent to thickened blood-vessels, accompanied by displaced or completely degenerated nerve-fibres,

FIG. 10.

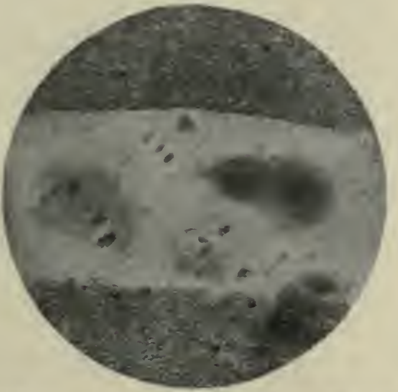


Perivascular sclerosis. Hemisection of upper lumbar cord. (Reichert ¼ inch, ocular II.)

and are most abundant in the lateral and posterior columns (Figs. 10 and 11). No evidence of normal or atrophied nerve-fibres could be discerned in these areas. Many nerve-fibres in close proximity to these sclerosed patches were degenerated, as evidenced by atrophy of their axis-cylinders, with swelling and breaking up of the myelin. Specimens stained after Marchi's method showed a few degenerated nerve-fibres sparsely distributed throughout the different columns of the white matter; but no distinctly traceable area of degenerated nerve-fibres could be found. The anterior and posterior nerve-roots contained no degenerated nerve-fibres. The nutrient bloodvessels of these roots were dilated and presented thickened walls. The nerves of the cauda equina were found normal.

The Nerve Cells of the Spinal Cord. This description is based upon the study of several hundred sections from different levels of the sacral lumbar, dorsal, and cervical regions, stained after the method of Nissl, compared with like sections from a normal spinal cord and observed with a Zeiss 1/12 apochromatic homogeneous immersion lens. The multipolar cells of the anterior cornua are with but few exceptions surrounded by pericellular lymph spaces much increased in size (Fig. 9). Some of these spaces were empty, while others contained a fine granular detritus. All the cells contain an increased amount of normal yellowish granular pigment. This pigmentation (chromatosis) involves in most instances more than half of the protoplasm of the cell body, and in many cells it is so great that the chromatic particles (Nissl bodies) and the nuclei of the cells are with difficulty discerned. Many cells have lost their normal irregular outline, having become circular in shape with degeneration of Nissl's bodies (chromatolysis) and very marked chromatosis. The nuclei of these latter cells contain achromatic particles, which are degenerated or else contain granules which stain faintly blue with Nissl's stain, and have lost their glistening, granular appearance, and appear pale and cloudy. The nuclei are frequently found excentrically placed, some displaced to the margin of the cell bodies, others producing varicosities along the margin (Fig. 12). Many nuclei were observed having an irregularly oblong form, with dentations of the nuclear envelope. About a fourth of the cells of the anterior cornua are so degenerated that they have become distinctly atrophic, and are contained in very wide peri-

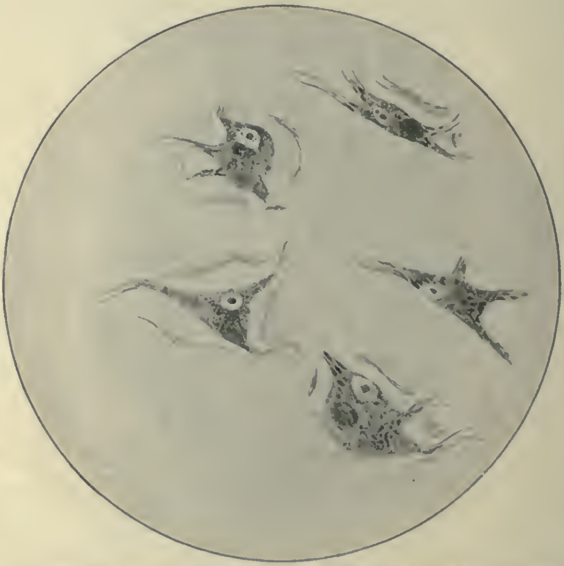
FIG. 11.



Microphotograph of lumbar cord, showing a large (confluent) patch of perivascular sclerosis, containing two thickened bloodvessels. A few corpora amylacea present.

cellular spaces, are devoid of protoplasmic processes, and present elongated vacuolated nuclei. Some cells are less than one-third their normal size, while a few are so atrophic that with one-fifth objective they can just be recognized as such. In the most atrophic cells no nuclei or Nissl's bodies could be seen. The above-described cellular changes were found throughout the cord, but are more marked in the upper lumbar and lower cervical regions. The cells composing the vesicular column of Clark and Stilling present similar changes, but to a much less degree. They are all surrounded by dilated pericellular spaces, and are densely pigmented. Only a few extremely atrophic cells were found. Some cells showed slight chromatolysis. Some cells contained only a few unusually large tigroid bodies. A few of these cells contained nuclei excentrically located, the nuclei producing distinct varicosities.

FIG. 12.



Five anterior horn-cells, showing degeneration of Nissl granules and excentric nuclei. (Zeiss 2 mm., ocular IV.)

The vesicular cell group of the left side contained, by actual count, twice the number of cells of that of the opposite side. Some of Clark's cells were found very atrophic and filled with minute granules. They contained no visible nuclei. The nuclear membranes of some of these cells were irregular, the nuclei containing granules which stained blue.

Medulla Oblongata. The changes found in the medulla are similar in character but less extensive than were those found in the spinal cord. The medulla on transverse section appears symmetrical. There is an increase of neuroglia throughout. This increase is most abundant along the periphery, where the large hypertrophied bands extend deep into the white matter. The bloodvessels are numerous, present thickened walls, are dilated, and contained in wide perivascular spaces. There is an enormous increase in the number of small capillary vessels, both in the formatio reticularis and the olivary bodies. A few small disseminated patches of sclerosis are to be seen around some of the bloodvessels. The nerve-cells of the olivary bodies, as well as those composing the nuclei of the posterior and lateral columns, and those for the various cranial nerves connected with the medulla, apart from containing cells which are deeply pigmented and surrounded by wide pericellular spaces, appear normal. They are not degenerated nor atrophic. Their nuclei are spherical and for the most part centrally placed. The Nissl bodies are normally arranged and present no evidence of degeneration. Numerous corpora amylacea are present. The intranuclear brushes or fibrils are normal. Marchi's, Weigert's, or Pal's methods disclosed no degeneration of any of the various tracts of the medulla. The ependyma of the fourth ventricle was not thickened or granular.

The Cerebellum. The changes in the cerebellum were almost entirely confined to the bloodvessels and neuroglia. The sections through the cerebellar cortex and the underlying white matter were studded with large numbers of dilated and tortuous capillaries, often presenting in their course small sac-like dilatations. Most of these vessels rested in dilated perivascular canals. There was a general increase of neuroglia, but not nearly as extensive as was found in the spinal cord or medulla. Unfortunately the cubes of cerebellar cortex preserved for Nissl's stain were lost, the cellular changes being studied only after the method of Golgi. This method is very exact for the study of minute changes in the protoplasmic branches, especially the dendrites (Berkley), but is of no particular value for the study of minute cellular changes. The small cells of the superficial cortical layer presented the normal number of dendrites devoid of excrescences, and gave off axones normal as to length and destination. The deep stellate so-called "basket" cells are possessed of normal dendrites and axones, the latter giving off the usual number of descending collaterals with their basket-like expansions. No pathological changes could be discovered in the dendrites or axones of the cells of Purkinje. The formation of their arborizations was perfect, and none of the branches possessed tortuous, ampullar, or moniliform swellings. They were all clothed with the normal number of gemmules. The cell bodies appeared normal in size and shape.

Pons Varolii. Sections through the pons varolii showed an increased pigmentation of its nerve-cells with a few thickened and dilated vessels, together with a slight increase of neuroglia.

The crura cerebri and internal capsules contained no degenerated fibres.

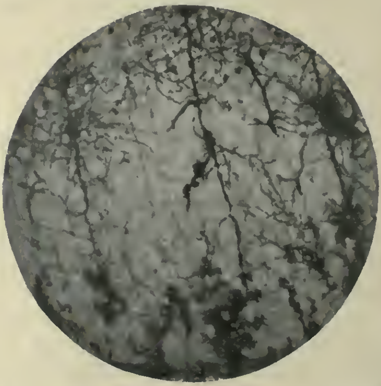
The substantia nigra, corpora quadrigemina, and nuclei of the third and fourth nerves were normal.

Basal Ganglia. Sections through the basal ganglia (optic thalami and corpora striati), as compared with normal ones, showed an enormous increase in the number of capillary bloodvessels. Many of the vessels of medium size presented thickened walls. Small blood extravasations were found in both ganglia, but especially in the lenticular nuclei. Throughout all the sections of these ganglia a round-cell infiltration was observed similar to that seen in the cord. The cells of these ganglia appeared normal, although contained in dilated pericellular spaces. There seemed to be no increase of the neuroglia elements.

Cerebral Cortex. The examination of the sections made from the various lobes of the cerebrum revealed the following changes: In the frontal, temporal, parietal, and occipital lobes no marked cellular changes were observed apart from an increased deposit of pigment and dilatation of the cellular spaces. There was a slight increased vascularity throughout, with what appeared to be a slight increase of the neuroglia elements.

Motor Cortex. The most marked cortical changes were observed from sections taken from all parts of the motor areas. Weigert's or Pal's stain failed to reveal any degenerative changes in the complex of cortical fibres. A general round-cell infiltration was found throughout the gray and white matter.

FIG. 13.



Microphotograph of motor cortex, showing two pyramidal cells whose apical dendrites have moniliform swellings. (Cox-Golgi stain.)

The cortical cells showed changes identical in character, but not as extensive as were found in the anterior cornual cells. The layers of the pyramidal cells showed only a few that were distinctly atrophic; many of them, however, presented early degenerative changes, as evidenced by excentrically placed and swollen nuclei, with, in many instances, a transformation of the Nissl bodies into minute granules. Many of the cells were deeply pigmented, and were contained in enlarged pericellular spaces. Some of the cells were devoid of processes, but in most cases these were retained. The Golgi method revealed the fact that the majority of the pyramidal cells had retained their processes, which appeared normal. In a few instances, however, the apical processes were found devoid of gemmules and contained tuberous excrescences (Fig. 13). All sections showed an increased number of capillary vessels, some of which were dilated and surrounded by enlarged spaces. In only a few cases were their walls found thickened. Minute capillary hemorrhages were rather frequent. There was a slight increase of neuroglia.

A SUMMARY OF THE PATHOLOGICAL CHANGES.

A careful study of the changes in the nervous system in the cases of paralysis agitans examined by modern microscopical methods show the following characteristic alterations:

Spinal Cord. Occlusion with dilatation of the central canal of the spinal cord was observed in twenty cases, the occlusion being due in most instances to proliferation of the ependymal cells.

Neuroglia. In all the cases there was found a general increase of the neuroglia elements throughout the entire extent of the cord. The subpial neuroglia layer was usually found thickened, as well as the numerous neuroglia septa extending from it into the cord. In ten of the cases the most marked proliferation of the neuroglia was found in the lateral and dorsal columns, with an especial predilection in the former for the crossed pyramidal tracts. The pia mater, together with the process extending into the ventral median fissure, was usually found thickened.

Nerve Cells. The nerve cells of the anterior cornua and those composing Clark's vesicular columns were found deeply pigmented, the excess of pigment granules often obscuring from view both the granules of Nissl and the nuclei. Distinct degenerative changes were found in the anterior horn-cells in at least twelve cases. These changes consisted in a loss or separation of the protoplasmic processes from the cell bodies and alterations in form of the cell bodies, they often assuming a spherical instead of an irregular outline. The Nissl granules were frequently found degenerated, and the nuclei often assumed an excentric position along the periphery of the cells. In many of the cells this degeneration was so extreme that they were found very atrophic, and were contained in wide pericellular lymph spaces.

Bloodvessels. Among the most characteristic changes were those observed in the vascular system. There was an enormous increase in number of bloodvessels of both the gray and white matter throughout the cord. These vessels were often found dilated and tortuous, and many of them presented in their course ampullar or sacculated diverticuli. The walls of the vessels were usually thickened, there being a proliferation of tunica intima and media, and not infrequently of the tunica adventitia. The bloodvessels were usually contained in dilated perivascular spaces, and were often surrounded by islets of sclerosis (perivascular sclerosis).

Perivascular Sclerosis. This form of sclerosis first accurately described by Redlich, and observed in eight of the cases herein collected, consists of areas of degeneration about the thickened bloodvessels, due to proliferation of the neuroglia elements, accompanied by displacement, together with degeneration of the nerve-tubes from constriction and pressure. The perivascular sclerosis was only observed about the bloodvessels of the white matter, being particularly associated with the vessels of the lateral and posterior columns. It is interesting to note in this connection that in none of the cases was a distinct degeneration of any tract or system of fibres in the white columns of the cord, medulla, or pons observed.

Amyloid Bodies. There was in most cases an infiltration of the white and gray matter by numerous corpora amylacea. They were very abundant in the lateral and posterior columns. In the gray matter they seemed to prefer the posterior cornua. A universal, small, round infiltration was seen in several cases. This infiltration in my own case was found to be escaped leucocytes.

Nerve-roots. The nerve-roots were found slightly degenerated in three cases—those of Borgherini, Dana, and Redlich. In the cases of Borgherini and Redlich a few atrophied fibres only were found. In Dana's case the nerve-roots were congested and perforated by dilated bloodvessels.

Muscles and Peripheral Nerves. Slight changes were observed in the muscles and peripheral nerves by Sass, Borgherini, and Redlich, and in the peripheral nerves alone by Koller, Ketscher, and Hunt. They consisted of atrophy of nerve bundles, with proliferation of nuclei and thickened endoneurium and perineurium. The muscle fibres were atrophic, the connective tissue increased, and the walls of the bloodvessels thickened.

Medulla and Pons. The changes in the medulla and pons, although similar in character, were much less extensive than those found in the spinal cord. There was a proliferation of the neuroglia elements along the periphery of the medulla and pons, and numerous hypertrophied bands extended deep into the columns of the white matter, and especially among the fasciculi composing the anterior pyramids of the medulla. The ganglionic cells of the pons varolii and those of the olivary bodies, together with the cells of the cranial nerve nuclei, were moderately pigmented and rested in wide pericellular spaces. In the case reported by Dowse the cells of the olivary bodies and those composing the nuclei of the auditory and glossopharyngeal nerves were degenerated. Borgherini found the cells of the pons varolii pigmented and their processes stunted. He also found atrophy of the cells of the vagus, facial, and motor oculi nuclei. In Dana's case pigmentation, degeneration, loss of processes, and atrophy of the cells comprising the nuclei of the facial, glossopharyngeal, vagus, and spinal accessory nerves existed.

Cerebellum. Of the twenty-four cases referred to in this summary mention of the changes in the cerebellum is made only by Dowse, Redlich, Borgherini, and Hunt.

Dowse found granular degeneration of the cells of the corpora dentati and folia of the cerebellum. Borgherini found dilated and thickened vessels and pigmented nerve-cells resting in enlarged pericellular spaces. In the cases of Redlich and Hunt the cerebellum was found normal. Dana does not refer to the condition of the cerebellum in his case, although specimens were taken from it for study; hence, it is presumable that nothing abnormal was found. In my case the changes were confined exclusively to the bloodvessels and neuroglia. The cerebellar cortex and underlying white matter were studded with dilated and tortuous capillaries, which rested in enlarged perivascular spaces. There was a general increase of neuroglia, much less extensive, however, than that observed in the cord and medulla. The cells of the cerebellar cortex and dentate nuclei were found normal.

Corpora Striati and Optic Thalami. The basal ganglia appear to have been examined in only four cases—those of Dowse, Redlich, Dana and the author.

In Dowse's case the corpora striati were said to have been honeycombed with a miliary degeneration. Slight changes (the character of which was not mentioned) were found in the optic thalami. In one of Redlich's cases the basal ganglia contained a few small pinhead-sized areas of softening. In the case reported by Dana the optic thalami showed a fine capillary injection, slightly more intense than normal, with a few dilated bloodvessels at the boundary between the thalamus and internal capsule. In my own case the basal ganglia showed an enormous increase in capillary bloodvessels. Blood extravasations were found in both ganglia, but especially in the lenticular nuclei. Throughout all the sections of these ganglia a round-cell infiltration was observed similar to that seen in the cord. The cells of these ganglia were normal, but were contained in dilated pericellular spaces.

Cerebrum. The cerebrum was found diseased in but five of the eight cases. Koller found in his case congestion, with œdema of the brain In Redlich's case the convolutions appeared undersized, and the consistence of the brain rather firm. Borgherini found on microscopical examination of the cerebrum in his case small connective tissue processes starting out from the capillaries and shooting into the surrounding nerve tissue. The nerve-cells and fibres were normal. A moderate alteration of the capillary vessels was found, the walls being thick and rich in nuclei, their lumen enlarged, and the perivascular spaces dilated. Dana found no thickening of the meninges; the neuroglia layer was normal, but there was increased vascularity, with some dilatation of the bloodvessels, their walls not being noticeably thickened. The cortex of the motor area showed increased vascularity, proliferation of the neuroglia, and slight degeneration of the second and third layers of cortical cells. These changes consisted in a loss of contour, dropping off, and atrophy of the cell processes, together with a granular degeneration of the same. The cells stained faintly, often contained two nuclei, and rested in dilated pericellular spaces.

In my case the only changes found in the frontal, temporal, parietal, and occipital lobes was a slight increased vascularity, with a moderate increase of the neuroglia elements.

In the motor cortex no degeneration of the cortical fibres was found; a general round-cell infiltration existed throughout the gray and white matter. The cortical cells showed changes identical in character but not as advanced or as extensive as were those found in the cells of the spinal cord. The layers of pyramidal cells showed but few atrophic cells; many of them presented early degenerative changes, such as excentrically placed and swollen nuclei, with degeneration of Nissl bodies, marked pigmentation, and dilated cellular spaces. A few cells were devoid of processes, but in most cases these were retained.

Has Paralysis Agitans a Pathological Basis?

A careful review of the pathological changes observed in the twenty-four cases of Parkinson's disease examined by modern methods will convince the most skeptical that paralysis agitans can no longer be included among the diseases (neuroses) of the nervous system of a purely functional nature and without an anatomical basis. That this disease has a distinct pathological basis seems positive from the following facts: First. In all cases examined there was a uniformity and constancy in the results of the anatomical findings. Second. These involved the bloodvessels, neuroglia, and nerve-cells, resulting in a proliferation of the nuclei and thickening of the walls of the bloodvessels, with a proliferation of the neuroglia about the bloodvessels, forming by confluence patches or areas of perivascular sclerosis; pigmentation with degeneration and consequent atrophy of nerve-cells and fibres, the cells resting in dilated cellular spaces. Third. The spinal cord was in all cases most affected, and in a few cases was the only part of the cerebrospinal axis possessing pathological changes, these changes being most marked in the gray matter and in the lateral and posterior columns of the cervical and lumbar enlargements. Fourth. The lesions, although similar in character, decrease in intensity brainward, the brunt of the affection being confined to the spinal cord. Fifth. The changes, while resembling those found in senility, differ from them in intensity, in the presence of typical patches of perivascular sclerosis, in the absence usually of general arterio-sclerosis, and in being associated with a group of characteristic clinical symptoms which often appear long before senility, and when once begun continue to invade, without cessation or intermission, little by little the entire body, producing a clinical picture as distinct and characteristic as that of any disease organic in nature with which we are acquainted.

Dubief, Borgherini, Koller, Sass, Jacobsohn, and Ketscher, and very recently Sanders, believe paralysis agitans to be the expression of a very intense but precocious form of senility of the nervous system. Their view is based upon the microscopical study of spinal cords from a number of persons advanced in life and evidently having no clinical symptoms indicative of changes in the nervous system. They found obliteration of the central canal, pigmentation of the nerve-cells, thickening of the bloodvessels, and a general increase of neuroglia throughout the cord, all of which changes were much less marked than those observed in paralysis agitans. I have had the opportunity of comparing the specimens taken from the spinal cord of my case of paralysis agitans with those taken from the cords of two senile cases, one aged sixty-six years, of lymphatic leukæmia, without nervous symptoms, but with general arterio-sclerosis; the other case, aged sixty years, of protracted nephritis, with general arterio-sclerosis. The findings were alike in both of these cases, and were not nearly as intense as those observed in the case of paralysis agitans. They were as follows: Slight thickening of the bloodvessels, particularly in the posterior portion and lateral columns; a general but slight increase of the neuroglia; the subpial neuroglia layer was a little widened, corpora amylacea were frequent, the central canal was obliterated; there was no abnormal dilatation of the pericellular or perivascular spaces; the nerve-cells were pigmented but little more than normal; none of the cells presented degenerative changes, and no perivascular sclerosis could be found; the cord from the case of leukæmia presented none of the anticipated changes incident to that disease.

Location and Nature of the Changes. The primary seat of the pathological changes of paralysis agitans is doubtless in the bloodvessels. It starts with an endoarteritis and periarteritis, and consequent proliferation of the neuroglia in the immediate neighborhood, with the production of patches or islets of perivascular sclerosis, which are characteristic of this disease. While in my own case a few areas of perivascular sclerosis were found in the medulla, in all the other recorded cases they were confined to the spinal cord. In the cord they were found only in the white matter, with an especial predilection for the lateral and posterior columns of the lumbar and cervical enlargements. In only one other disease of the nervous system has perivascular sclerosis been found. I refer to the disease recently described by Demange as contracture tabetique, and by Gowers as senile paraplegia. In this disease the clinical symptoms and the pathological changes are so closely allied to those found in the form of paralysis agitans without tremor that it may be considered a prototype.

A careful study of the alterations that have been observed in the nerve-cells of the anterior cornua and cranial nerve nuclei, together with the slight changes observed in the cells of the motor cortex, seems to prove that these alterations are secondary, they being due in all probability to a gradual diminution of nutrition dependent upon the vascular changes. It will be seen that the pathological changes in paralysis agitans are those of a slow or chronic inflammation involving chiefly the spinal cord, medulla, and pons, and, to a less degree, the motor cortex, attended by the production of an enormous amount of neuroglia tissue, and an increase in number and thickening of the bloodvessels, together with a degeneration of nerve-cells and fibres, but without the destruction of any of the various tracts of the white columns of the cord, medulla, or pons. The peripheral nerves and muscles undergo changes similar in character but very much less in intensity. The abovementioned changes resemble very closely those of a chronic myelitis, only differing from the changes of the latter disease in the islets of sclerosis and in the absence of the involvement of the fibre-tracts of the white matter.

Dana believes, on purely hypothetical grounds, that the pathological changes of paralysis agitans are due to a toxin allied to the substances which excite gouty, rheumatoid, or arthritic troubles, which is possibly produced by defective metabolism. This toxin, which circulates in the blood, has an especial affinity for certain areas of the spinal cord and medulla, and, to a less extent, for the peripheral nerves. This toxin he believes, owing to its irritating nature, excites the tremor and pain and produces the vasomotor disturbances, with later degeneration and destruction of nerve-cells and fibres.

Various theories explanatory of the symptoms of paralysis agitans have been brought forth, among the more important of which may be mentioned those advanced by Gowers,[1] Dana,[2] Brissaud,[3] Cuylits,[4] and Ballet.[5]

Gowers believes that the motor cells of the cerebral cortex are the seat of the morbid action upon which the symptoms of this disease depends. His theory is based upon the following facts: First, the tremor (which is an alternating contraction in opposing muscles, causing rhythmical movements of the parts to which they are attached) ceases, even when severe, during sleep; second, the tremor is usually unilateral in its beginning and hemiplegic in its extension, this being unlike the progression of the spinal cord affection; third, the tremor is arrested on the affected side by an attack of cerebral hemiplegia, Gowers having observed such a case. Gowers thinks the tremor may be due to an intermitting release of nerve force from the motor cortical cells, the rigidity being due to a continuous though slighter release, while the weakness is due to a lessened capacity for activity.

Dana's theory for the causation of the symptoms of this disease is based upon the study of his own case. He found in a large number of sections of spinal cord the fibrillary network in the anterior horns very much atrophied, hence he believes that the primary lesion in paralysis agitans is a degeneration of the end brushes of the motor tracts and the reflex collaterals from the posterior nerve-roots, all of which surround the cells of the anterior horns; the degeneration of the end brushes of the motor tract producing a hitch or stoppage in the volitional impulses coming from the cortex, causing the tremor and rigidity, the degeneration of the reflex collaterals explaining the diminution or absence of the superficial reflexes.

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[1] Gowers. Diseases of the Nervous System, vol. ii.

[2] New York Medical Journal, June 10, 1893.

[3] Brissaud. Journal de Médicine et de Chirurgie pratique, Paris, 1894, 4, s. iv. 641–663.

[4] Cuylits. Presse Médicale Belge Bruxelles, 1897, xlix. 121–124.

[5] Gilbert Ballet. Bull. et Mem. Soc. Méd. d. Prop de Paris, 1898, xv. 40–43.

Brissaud believes the symptoms of paralysis agitans to be due to destruction of the locus niger. His theory is based almost exclusively upon the fact that M. Blocq and Marinesco, in 1893, had a case of a circumscribed tubercular tumor, easily enucleated, and therefore incapable of the phenomena of diffusion, which compressed the lower part of the crus cerebri, completely destroying the locus niger. In this case they observed a Parkinsonian hemiplegia on the side opposite the lesion. Brissaud believed that in this territory of the substantia nigra, situated on the confines of the fibres for voluntary and automatic movements, one should seek for the centre of muscular tonus. A lesion of this zone, according to Brissaud, in the vicinity of the bulbar nuclei of the face and of the psychic bundle would account for the rigidity, for the trouble in mimickry, and for the apparent mental trouble. In other words, a lesion of the locus niger could well be the anatomical substratum of the disease of Parkinson.

Cuylits, who believes the tremor to be the pathognomonic symptom of paralysis agitans, has created a very ingenious theory for the causation of it. He believes paralysis agitans to be a malady characterized by the disassociation or the persistent retraction of the protoplasmic prolongations of the cortical motor neurons. His theory is based upon the fact that in dementia paralytica, alcoholism, morphinism, and chloralic intoxication (all conditions attended by a tremor very like that of paralysis agitans) the protoplasmic prolongations of the cortical nerve-cells present moniliform swellings, which occasion retraction and consequent disassociation of these processes. Therefore, he assumes that this retraction and disassociation increases the normal number of oscillations producing an exaggerated muscle tonus or tremor.

Ballet believes (from the study of his own case) the primary lesion of paralysis agitans to be ruptures of the protoplasmic processes of the multipolar nerve-cells of the anterior cornua of the spinal cord, and thinks that this disassociation of the protoplasmic processes occasions the muscular rigidity and tremor.

It is evident that most observers who have advanced theories in regard to the nature of the pathology of paralysis agitans have started with the symptoms as a basis. This seems entirely wrong, for the pathological changes must produce the symptoms, and with such changes as a basis a theory must be built that will reasonably explain the concomitant phenomena. That such changes do occur in paralysis agitans with uniformity and constancy is proven by the cases herein collated. It is evident from the study of these changes that paralysis agitans is primarily a disease of the spinal cord. Here we find the most marked, the most advanced, and, in some cases, the only changes. From the cord, the medulla, later the pons, and the higher centres become very gradually involved.

Gowers, as above mentioned, thinks that the materies morbi is in the brain, but the facts upon which his theory is based are not entirely correct, since in many cases the tremor often continues through sleep, and in not a few cases the tremor does not follow the hemiplegic type of development, but often starts in one extremity to invade later the other extremity of the opposite side.

M. Allen Starr relates three cases where the tremor began in both hands, and one case in which it began in both feet. He also relates three cases where the tremor extended to three extremities. It is evident that an attack of hemiplegia, as shown by Gowers, will cause the disappearance of the tremor, but we could expect the same result from an attack of poliomyelitis or alcoholic neuritis. The localities where the morbid changes were most marked have been found to be, in nearly all the cases, in the lateral and posterior columns, as well as the anterior cornual cells.

In only one case (Dana's) was there found an atrophy of the fibrillary network of the anterior horns. These changes were carefully searched for in my own case, with negative results. It is evident that any theory having for its basis an atrophy of the motor end brushes and reflex collaterals would be inadequate, since if the reflex collaterals were destroyed there would be an absence of not only the superficial but of the deep reflexes, which latter reflexes we find normal or slightly exaggerated. Then, too, a destruction of the end brushes of the motor tracts would cause no different symptoms than would a destruction of the fibres of these tracts in any part of their course, as seen in lateral or multiple sclerosis. Instead of the rather fine and constant tremor which often subsides on voluntary motion, so characteristic of paralysis agitans, we would expect a coarse tremor increased by such motion, common to multiple sclerosis.

Brissaud's theory that paralysis agitans is due to a disease of the locus niger is not at all conclusive, since symptoms resembling somewhat those of paralysis agitans have occurred in but one case of tumor destroying the locus niger. On the contrary, in all cases reported of true paralysis agitans no lesion of the locus niger was found.

The theory of Cuylits is ingenious, to say the least, were it supported by pathological evidence; but in only a very few cases of Parkinson's disease have the moniliform swellings so essential for the correctness of this theory been demonstrated.

The rupture of the protoplasmic processes of the anterior cornual cells, as advanced by Ballet, can with difficulty be reconciled with the clinical symptoms of rigidity and tremor, for if these processes are destroyed a large number at least of the impulses which should pass through the cell bodies to the periphery cannot reach their destination, and hence a lessened muscular irritability would result.

It is evident that in paralysis agitans we have three characteristic changes: perivascular sclerosis, with an especial predilection for the dorsal parts of the lateral columns and the posterior columns; degenerative changes of the multipolar nerve-cells, and general hyperæmia, as evidenced by multiplication, thickening with local dilatation of the bloodvessels, together with cellular infiltration.

With a knowledge of the foregoing facts of pathology, it seems logical to believe that the tremor and rigidity, the two characteristic symptoms of this disease, are both due to one and the same cause—namely, an irritation from the presence of an increased amount of neuroglia in the posterior columns producing an excitability of the reflex collaterals of the posterior nerve-roots arborizing about the ventral cornual cells, which results in an increase of the normal rhythmic discharges of energy from those cells, producing at first the tremor and later the rigidity. The tremor, which is an alternate contraction of opposing muscles, causing rhythmical movements of the parts to which they are attached, is nothing more or less than an exaggerated muscle tonus. The muscle tonus is due to the normal discharge of nerve impulses from the anterior horn-cells, resulting in a slight rhythmic contraction of the skeletal muscles, the resulting tremor being so fine that its movements are invisible. They have been traced, however, by Lamacq, who invented an ingenious instrument for the purpose. The tracings and instruments were shown at the last meeting of the Neurological Congress at Nancy, in 1896. Gowers has shown that in the majority of cases of Parkinson's disease the tremor is the earliest symptom, and precedes the rigidity by a varying but distinct period of time. The rigidity, which I believe is also due to an increased excitability of the anterior cornual cells from the irritation of the reflex collaterals of the nerve-roots, is the result of the loss of equilibrium between the flexors and extensors, the stronger flexors overpowering the weaker extensors, until a general rigidity results, producing the carriage so typical of this disease. I do not believe that the perivascular sclerosis and increased production of neuroglia in the lateral columns (pyramidal tracts) takes any share in the production of the rigidity, as the rigidity is of an entirely different type from that due to sclerosis of the lateral columns, and is usually accompanied by an increase of the deep reflexes so characteristic of lateral sclerosis. The normal or slightly exaggerated patella reflexes found in all cases of paralysis agitans may be due to an increase of the normal inhibitory function of the cord, owing to irritation of the fibres composing the pyramidal tracts by the presence of an increased amount of neuroglia.

A few cases of Parkinson's disease have been observed in which the only diagnostic symptom was the rigidity, the tremor never having been present. Such cases have been reported by Charcot, Berger, Wienskowitz, Buzzard, Hardy, Beevor, and Brown. Two such cases have been under my personal observation, one of which with autopsy is herein reported, it being the only case autopsied of paralysis agitans without tremor on record. At first it seems rather difficult to explain, according to my hypothesis, the absence of the tremor, if that be due to the same cause as the rigidity. The mode of the onset of the rigidity in the cases of paralysis agitans without tremor may be of assistance in solving this problem. In both of my cases (and this has been the rule in most of the cases of paralysis agitans without tremor) the first symptom noted by the patient was the rigidity, it starting as an increasing stiffness in the muscles of the arms, neck, and back, soon to be followed by a bending forward of the head, neck, and trunk, with a flexion of the arms and adduction of the legs, resulting in an attitude typical of Parkinson's disease. In this connection it may be interesting to note that in many of the cases of paralysis agitans where the rigidity has progressed rather rapidly the tremor gradually diminishes in intensity, and frequently becomes absent. It seems reasonable to suppose that in the cases of paralysis agitans without tremor, where the rigidity is of rather rapid development, that it is also associated with a progressive and rapid growth of neuroglia, the irritation of which in the posterior columns so increases the excitability of the reflex collaterals that the voluntary muscles are kept in a condition of constant contraction, the stronger ones overcoming the weaker, and thus producing the characteristic attitude with an absence of the tremor.

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PROGNOSIS IN HEART DISEASE.

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IN many special treatises on diseases of the heart, especially those which have been published in later years, the prognosis of heart disease is pronounced less grave than it was formerly. Be it understood, however, that distinctions are made, and very properly, between the prognosis of valvular defects, with and without complicating dilatation, or structural changes of heart muscle. What is true of special treatises is equally true of certain well-considered articles in current periodicals on prognosis of heart disease. This is well, since formerly, as we know, both for the public and many in our profession, heart disease once proclaimed was also immediately stated to be incurable. In a similar manner, if a death occurred suddenly or apparently in an unexplained manner, heart disease was frequently made to account for it. Sometimes there was really no reason for this belief, or, again, the evidence of previous heart disease was quite insufficient; or, still further, while it was known, or understood, that the dead person had during life some "so-called" heart affection, it was not accurately determined what the nature of the cardiac trouble was. All this was a great pity, indeed, very damaging to the profession, because it was felt that our knowledge was very imperfect. At one time, for example, a diagnosis of heart disease was made, a serious prognosis confidently stated, and yet the patient lived on and enjoyed very good health for many long years, and was able without inconvenience to take part in all ordinary affairs of life. In other instances, it is true, a similar diagnosis and prognosis were made, and death, unfortunately, did occur very soon, sometimes suddenly or rapidly, sometimes after a period of several months or years of prolonged physical disability and suffering. Evidently error, ignorance, lack of fine discrimination and judgment, both in diagnosis and prognosis, were responsible for this situation, and it is high time that we should with increasing knowledge try to bring definiteness into many important questions. It is difficult to do so wholly, as is shown by the writings of a few, who even to-day are among our most advanced and prominent medical writers. But it is desirable to map out as well as possible some important relations or essential facts.

One thing is true, and may be properly admitted from the start, that heart disease in general is quite as amenable to treatment as diseases of other important organs of the body (Semple). Of course, if at any time the heart stops beating for any appreciable time, death inevitably follows; but this statement in no way controverts the previous one any more than to say that if the lungs do not expand death must surely follow. Prognosis, as we know, means foreknowledge of what will occur. It therefore takes in and declares the probable course and sequence of a particular condition of organ. Considered in this aspect it is indeed a part of diagnosis, and a very essential, not to say the most important part (Broadbent).

In former times, before Laennec introduced his wonderful discovery of mediate auscultation, knowledge of heart disease was very inaccurate, and many judgments were very much like guesswork. Even in Laennec's day, while the abnormal cardiac murmurs were recognized, their accurate pathological significance was imperfectly determined. Now, when diagnosis of heart disease is made, the well-informed physician should be able to tell in advance in many instances what will surely occur. This results from the close relationship which has been established between clinical observation during life and the results of post-mortem examinations. As a consequence, we can frequently warn relatives or friends of the patient when his condition is such as to inspire real solicitude. We can also judge when the heart's action is no longer sufficient fully to answer to the task required of it, and secondary symptoms of its inadequacy have become manifest, that a fatal result will not long be delayed. Again, we know that in advanced aortic disease, for example, sudden death is always more or less imminent, and the fact should not be ignored when important family and personal affairs are in a way to be determined, and, perhaps, acted upon in view of this knowledge. On the other hand, we can feel confident at times that the importance of pathological bruits is much exaggerated, and this wrong estimate is merely due to the fact that their consequences are misstated or misinterpreted. Hence, we are fortunately prevented from causing undue anxiety or terror when there is really no reason to be specially apprehensive at the time the murmur is first recognized, or, later, provided an intelligent supervision and judicious care of the person affected be exercised. What is also true, however, and what should never be ignored, but make us additionally careful and watchful always, is the fact that many serious affections of the heart, where there is limited or diffuse structural degeneration, are not infrequently present, and yet they are never detected during life, and it is only at the necropsy that the fatal result is clearly explained and accounted for. Whenever, in auscultation of the heart, an abnormal murmur is discovered, it is a matter requiring careful consideration as to whether the patient should be informed of the fact, particularly if prior to this sometimes accidental discovery by the attending physician the patient never experienced any unpleasant symptoms from its presence. It is clear, then, that whilst it may be, and often is, an obvious duty to inform the nearest kin of the evidences of heart disease which exist in an individual where the probable consequences are serious or fatal, it is unwise to accentuate a situation and convey wrong impressions about a thing of little moment. Of course, it is very wrong, where the risks of a heart affection are grave or imminent, to withhold this knowledge from relatives or friends, and later, when the worst has occurred, then only to announce the truth which was very surely determined by us some time previously.

It may be now fully understood that to make an accurate prognosis of heart disease requires the highest wisdom, widest experience, and keenest insight of disease on the part of the clinician (Broadbent). It is this power of prognosis which wins confidence of patients more, perhaps, than any other quality; and whenever the future course of disease corresponds with the statements made by the practitioner, it tends in a marked degree to increase their fealty toward him, and strengthens their recognition that in him they have found their most trusty adviser. In a past generation, among those who have most advanced our knowledge and discrimination of heart disease, we should mention Bouillaud, Stokes, Hope, and Williams. To-day these men have been ably followed by Sansom, Balfour, and Broadbent. It is to the latter particularly that we are largely indebted, I believe, for much knowledge we now have to base our prognosis on probabilities which shall render our foresight of the course and consequences of heart disease more intelligent and satisfactory than it has ever been prior to the present period. To those who are unfamiliar with his papers, I would direct careful attention to his lectures on "Prognosis in Valvular Disease of the Heart," delivered before the Harveian Society in 1884, and to the Lumleian Lecture at the Royal College of Physicians on "Prognosis in Structural Disease of the Heart," delivered in 1891. As he has pointed out, whatever makes one's prognosis of heart disease more accurate also improves our treatment.

In the first studies of Broadbent treatment was not, however, touched upon, and it is only at a later period in his able work on heart diseases, published in London in 1897, that this subject is given the attention it demands. This is true in its widest acceptation, for the reason that we know from frequent experience that many states of the heart are favorably influenced by treatment only when we consider fully all the bearing which disorders elsewhere in the economy may have upon them. We shall first consider the prognosis in valvular disease of the heart, as these are the affections we meet with most frequently, and, moreover, are those about which we have most accurate information. In these affections it is important to know the valve or orifice affected, as well as to know the stage of the disease. Thus, for example, if it be the aortic orifice which is involved, we know the danger of sudden death from this form of disease is only too real. Indeed, it has been stated by more than one eminent authority that it is the sole form of valvular disease in which a sudden fatal result is to be dreaded. To this I can scarcely subscribe, if I be permitted to recur to my personal experience. Already several times I have had under my care in hospital wards patients who were under treatment for manifestations of cardiac inadequacy, functionally speaking, and who died suddenly with slight premonition of what would occur. It is true that in these instances the patients were being treated for symptoms more or less disturbing, and while we did not anticipate a fatal termination so suddenly, yet we certainly regarded the patients as sufferers. In aortic regurgitation it is different, since, in many instances, the patient seems very well indeed, able and willing to indulge in all kinds of recreation, or to fill an active business life with freedom' and without distress. Under these circumstances sudden death may occur without warning, and it is this fact, indeed, which causes assuredly the popular dread which prevails about heart disease.

The question as to the stationary or progressive character of the heart lesion is also important. From this point of view, especially among old people, aortic regurgitation would appear to be especially dangerous, since the lesion is apt to advance rapidly, and compensatory hypertrophy rarely occur. Here, again, I have seen exceptions, and have under my care a notable one at the present time. Already my patient is an old man, and the aortic regurgitant lesion is very marked; still, in several years the lesion has advanced very slightly, if at all, and the cardiac hypertrophy is very considerable, and has proved in the main satisfactory. At present it is true my patient suffers from dyspnœa upon exertion, but this is not very severe, unless he overexerts himself, and at times it is due to his somewhat asthmatic tendency, and is more under the immediate result of his gouty tendency than of cardiac weakness from the valvular disease. Murmurs indicate, as a rule, the valve or orifice affected, but do not show the gravity or the state of the lesion. Damage to orifice or valve may be very considerable, and yet the murmur may be very low and soft. We may have, on the other hand, very loud and intense murmurs at the heart, and yet the cardiac lesion of orifice or valve may be very slight. The soft murmur may depend simply upon the weakness of the heart or its inability to produce a powerful vibratory noise. If the heart gains in strength and vigor the murmur may become more pronounced, prolonged, intense, and harsher. Whenever the murmur is post-systolic or post-diastolic it indicates that regurgitation is inadequate, according to Broadbent, and that the heart valves remain together only a very short time.

In many of these cases of systolic bruit at the apex, and especially in those which are not conducted into the left axilla, and are somewhat permanent in character, they are due to chronic dilatation of the heart which from the point of view of the prognosis is far more important than an *endocarditis* producing mitral regurgitation. Frequently the necropsy shows that the amount of endocarditis is small, and in any event does not satisfactorily account for the presence of great heart weakness, which existed previous to a fatal termination. It is the amount of dilatation, then, of the ventricular cavities, combined with more or less hypertrophy, which is the really important condition, and not the endocarditis which is present in greater or less degree.

I believe that what Lees says so well in speaking of children is equally true of adults: "Of course, the regurgitation at the mitral orifice produces increased tension in the left ventricular cavity as well as in the left auricular cavity, but we must never lose sight of the fact that weakness of the heart muscle makes this condition serious, and not the mere valvular insufficiency which precedes therefrom, or may be increased, indeed, somewhat by endocardial inflammation. In children both dilatation and endocarditis may be of rheumatic origin." The gravity of the case depends more upon the inflammatory condition of the heart muscle, especially in children, than it does upon the concomitant valvular affection. Moreover, the frequency of rheumatic carditis in children is greater than in adults. If carefully managed during and subsequent to the acute rheumatic attack, a fatal result does not ordinarily follow, at least in the beginning. Later on, and before adult life is reached, we occasionally meet with children whose hearts are irrevocably damaged with disease of progressive nature, and do what we may, death surely occurs before adult life is attained. In the history of such cases we usually find several pronounced outbreaks of acute rheumatism. At the autopsy the valvular trouble may be slight, or pronounced, but in any event the heart muscle is degenerated as shown to the naked eye and with the microscope. If the mitral valve be affected, as it commonly is, the affection is rather that of insufficiency than stenosis. If pericarditis be present in children it is of more importance, as a rule, than the endocardial inflammation. Owing to the intimate relations of the visceral layer of the pericardium with the heart structure beneath, structural changes are apt to extend to and implicate considerably the heart muscle, either causing inflammation or degeneration of cardiac fibres. The gravity, as Lees observes, proceeds in these instances from this fact, and not from the presence of the effusion in the pericardium, which frequently is only very moderate in degree. We can readily understand, if the heart muscle become inflamed or degenerated, that the power of the heart action is diminished. With this diminution of power there ensue dilatation of heart cavities and thinning of heart walls. Hence, blood accumulates in the ventricles during diastole, and is not expelled as it should be. If nutrition and rest of the child be suitably and continuously provided for, genuine hypertrophy of heart walls may ultimately follow, and despite notable cardiac enlargement the heart may still be able to answer satisfactorily to its requirements. If the contrary be true, viz., if nutrition continue at a low ebb, and the young lad or girl be permitted to exercise or play imprudently, the hypertrophy which follows, if it does follow, is of the pseudo variety, which partakes, indeed, of a subacute or chronic inflammatory character. It is wise to bear in mind, as has been more than once insisted upon, how important it is to combat properly all acute or chronic manifestations of the rheumatic or other poisons, even though they do not appear at the time to have notably affected the heart so far as auscultation or percussion may reveal. I am not of the opinion of those who would insist upon large doses of the salicylates or other so-called anti-rheumatic remedies, because I do not believe that their apparent curative effects are always obtained without ultimate real injury to the patient. I do believe that the dietary should be carefully watched, the emunctories of the economy, skin, bowels, and kidneys kept in good functional order, and when the patient's general condition permits that a change inland from the seashore or from the city to the country be insisted upon. It is believed by some prominent writers that the differential diagnosis between acute cardiac dilatation and pericardial effusion is readily made. In my experience this diagnosis is very difficult at times, and we are compelled to fall back upon what we know of the results of autopsies to justify us in our affirmations. Usually where the dilatation has come on rapidly, and where no pericardial friction is made out, the probabilities are more in favor of the dilatation. Again, we can usually distinguish the position and strength of the apex beat better with a dilated heart than we can when the pericardial sac is considerably distended. Weakness, irregularity, and rapidity or slowness of the pulse are favorable in my judgment to a diagnosis of dilatation. In chronic cases of pericarditis where the two layers have become extensively adherent, or adhesions have been formed between the pericardium and the pleura or mediastinum, these very adhesions prevent the heart from properly contracting, and thus tend greatly to increase its dilatation. In a greater degree even this is probably also true where the great vessels are much constricted by old adhesions.

In many instances of acute or chronic dilatation of the heart we have a mitral murmur, systolic as to time. If this murmur be conducted to the left axilla, doubtless it frequently means a certain amount of endocardial inflammation. In very many cases, however, it is a mere indication of the cardiac dilatation, and the mitral orifice is enlarged simply because the left ventricle is enlarged. Such instances are frequently encountered in general practice, and it is to their intelligent appreciation and treatment that curative results are due where, without this medical acumen, the case would go on indefinitely without a cure, or suddenly develop phenomena of heart failure, which are alarming for a time, and only benefited by a systematic rest cure and judicious management under the care of a wise physician and tactful trained nurse in the course of six months or longer. In the society girl we find one notable example of this kind of cardiac dilatation. What with lunches, afternoon teas, dinners, late parties, and balls, where dancing is carried on to the small hours, and bed only reached when the body is exhausted, no wonder that loving, anxious mothers come pleadingly to the family physician for relief. The girl is pale, anæmic, probably constipated, leucorrhœic, or has profuse menses; or else dysmenorrhœic or amenorrhœic; she is always more or less fagged-out and tired. She sleeps until ten or eleven o'clock in the forenoon, takes her breakfast in bed, swallows innumerable Blaud's pills, because hæmoglobin is deficient and the corpuscles pale, even though the blood count is fairly normal. The urinary secretion is often colorless, of low specific gravity; no albumin, no sugar, no casts, but deficient elimination of urea. In older persons we fear interstitial nephritis. In young persons experience is consolatory, and we know rest, moderate massage, oxygen and iron, beef extracts and milk-punches between meals, and especially some properly formulated cardiac pill with time produces good results, backed up with early hours, plenty of sleep, and change of air. These cases occur in the older woman, also the society drudge, who, after innumerable social engagements, matinées, and evening operas thrown in lavishly, gives way finally, gets filled up with stomachal and abdominal flatus, becomes dyspnœic on slight exertion, has heart palpitation, and blue lips and finger tips in the very acute forms, and is revived at times only with hot water bags, mustard plasters, and hypodermatics of digitalis, strychnine, and nitroglycerin. The urine is occasionally loaded with pink urates, and pains of neuralgic character in different parts of the body are no uncommon features; or, again, we have the overconscientious, self-sacrificing, ever tender, loving, and far too devoted mother; she it is who holds the baby at night when sick and peevish, and the nurse tired out; she it is who looks after the older boys and girls, when properly they should care for themselves and for her, with ceaseless solicitude. She buys her daughter's dresses, goes with her whenever she can to all social functions, manages her household, looks after the servants, pays the bills, runs the bank account, rarely if ever gets a good, genuine rest, although never so well deserved, and one day breaks down more or less completely, only to be supported temporarily with cocoa and strychnine, and strophanthus frequently repeated. I cannot emphasize all these cases too strongly. They are not overdrawn, but are absolutely true, and only when recognized and properly cared for does the medical practitioner get the beneficial results which he most desires. Cardiac dilatation, vulgarly termed heart failure, is the true diagnosis, and this condition should never be ignored.

In the cases to which I refer the prognosis is always graver where there have been previous rheumatic attacks and where the rheumatic poison still gives indubitable evidences of its continued presence, for in these cases we must dread, and properly so, the hidden effect of the toxin of this disease on the muscle of the heart. It often weakens it through structural changes, and yet the cardiac dilatation may not be always appreciable to our physical methods of exploration. The heart is weak in its action, the pulse very soft and depressible, and dyspnœic attacks show themselves upon very slight exertion or whenever the emotions are at all excited. Such patients at times suffer from skin eruptions, ambulant neuralgia, headaches, constipation, stomachal indigestion, and abdominal flatus. The starches are very inimical to them, as also all sweets, and diets should consist mainly of meat for many weeks, despite the fact that for lack of exercise and open air the urine at times is loaded with urates. Frequently repeated doses of calomel and soda, with a saline purge following, is the best and safest way to combat these untoward symptoms. I have been obliged, in addition, to administer heart tonics by the rectum where the stomach and skin were both intolerant for a while.

Of course the endocardium may be inflamed in many of these cases, and we may discover a true endocardial bruit, which is caused by the roughening of both orifice and valves, mainly the mitral. But the endocardial bruit is not what should alarm us; it is the weakening of the heart muscle which takes place at the same time, and increases through leakage at the mitral orifice consequent upon dilatation, the intensity of the cardiac bruit, and is equally, or, more, indeed, the grave expression of the rheumatic poison. Again, as I have said before, there is no appreciable bruit at first near the apex, merely because heart action is too weak to cause it, and later, when the patient is doing fairly well, we hear the blowing murmur very readily. One of the difficult problems in practice is to determine accurately the presence or absence of the rheumatic poison, and it is only by the keen appreciation of the patient's previous history and the tentative effects of anti-rheumatic remedies that we may fairly obtain a conviction about it. The examination of the urine will not always prove it, as there may be a retention of excrementitious substances in the economy, which only repeated and most careful urinary analyses made under like conditions would determine. As to the symptoms, these are frequently of such indefinite character that we might easily be led astray. And yet sometimes the most powerful heart tonic is unquestionably the drug or drugs which eliminate the rheumatic poison from the system rapidly and without injuring the patient. In a certain number of cases I am confident that I have been of far more use and given greater relief to my patient with colchicin, salicin, or chloride of ammonium, and acetate of potash than I did by whipping up the heart action directly with strychnine and nitroglycerin.

The dulness of the right first intercostal space, to which Rotch has referred, does not seem to prove the existence of pericardial effusion as opposed to true dilatation of the heart cavities. More than once the hypodermatic needle has been used to determine accurately the presence of a serous effusion, and the result has been negative. The result of post-mortem examinations would also tend to show that in many similar cases the heart is simply enlarged and no pericardial effusion is present. Lees' and Broadbent's observations are especially corroborative of these facts.

The prognosis of heart disease is, of course, much influenced by ambient conditions and accidental circumstances. Wherever the cause producing secondary symptoms of heart disease is one which we have no power to change or modify, it is then very grave indeed. Where, however, there is present some condition which we can fairly hope to eliminate by judicious care, then our confidence is much greater that we can help our patient very much. How often do we see an anæmic girl who suffers terribly from cardiac distress relieved greatly by iron, mountain air, and proper exercise? Or, again, if the aggravating cause be cold, over-fatigue, sudden shock—all these accidental circumstances may lose their pernicious influence with treatment and time. It has long been recognized that the mere intensity of a murmur is no indication as to the gravity of a cardiac lesion. We may have a very loud bruit, and yet the heart lesion is really slight. On the other hand, a very serious change of orifice or valve may be indicated by a very low bruit. In general it may be stated that it is the amount of hypertrophy or dilatation which marks the gravity of the murmur, and despite the fact that frequently the enlargement of the heart is also a protective power against secondary symptoms, which we most dread. Prognosis of heart disease is also affected by the stationary or progressive character of the lesion. As we know, this is a very difficult matter accurately to determine, and we can only judge of the one or other condition by the manifestation or not of secondary symptoms, such as pain, palpitations, and dyspnœa, not to speak of the physical evidences with which we are all too sadly familiar. Circumstances outside of the heart influence prognosis; these are age, sex, occupation, heredity, etc.

Heart disease is certainly graver in youth than it is in middle life. Structural defects of the heart muscle are not infrequently inherited. A laborious life, or one full of cares and anxieties, aggravates very much the prognosis, whereas a life of ease is productive of a stationary effect in the development of symptoms of heart disease. Serous effusions into the large cavities indicate gravity. This is greater with aortic than mitral disease. It is, also, of more serious import where the effusions come on insidiously than where they develop after a sudden shock or accident. It is probable, in many instances, that the mere presence of organic heart disease does not materially shorten life or interfere notably with its reasonable enjoyment, or with the fulfilment of one's duties and responsibilities. I have taken care of several old men and women who have unquestionably had mitral or aortic disease during a greater portion of their adult life, and who nevertheless lived to an advanced age. Moreover, not infrequently, they have been very little annoyed from their heart affection, and very rarely suffered from symptoms directly attributable to it. Even when such secondary symptoms did occur, through carelessness or undue exposure, by a short course of judicious treatment they were soon again enjoying their usual health. There is a proper application here to the conduct of insurance companies. Some of these companies refuse to take any cases of heart disease; others do so, but charge them a larger premium. Wherever there are no secondary symptoms of heart disease or evidences of disease of other organs, it seems to be wisdom to accept such cases in the latter way as a proper business venture.

Cardiac enlargement, which in adolescent and adult life is most frequently under the dependence of obstructive or regurgitant disease of one or the other orifice, is often accompanied in old age with disease of the arteries. The arterial changes are sufficient of themselves, if not to cause intracardiac changes, at least to increase them when they have begun. Sometimes the myocardial degeneration connected with the increased size of the heart gives proof of its presence by distressing symptoms. Not infrequently, however, these changes exist for a shorter or longer period without manifesting their existence except by symptoms which indicate little or no gravity to the family physician. It is only when some really alarming symptoms declare themselves that anxiety of near relatives and friends is awakened. I have also known several cases in which sudden death occurred in which previously the patient had usually enjoyed a very fair degree of health and activity. Sometimes, it is true, that some cardiac pain, either spontaneous or occurring after moderate exertion, of a pseudo-anginal type, had occasionally been present, and yet no undue anxiety either of patient or of loved ones had developed. At the necropsy of such patients myocardial changes more or less extensive are readily made out, even with the naked eye. The coronary arteries are frequently inelastic, hard, calcareous, or atheromatous. In their immediate area of distribution, and particularly near their trunks and about the inter-ventricular septum, cardiac fibres are already indistinct, pale, and fatty. Usually such changes are accompanied by notable cardiac dilatation. It is probable that if the symptoms of these conditions prior to death be properly estimated much may be done to ameliorate the patient's condition, to relieve suffering, and doubtless at times to prolong life and one's usefulness very much. There are instances, however, of the senile heart with unquestionable enlargement which during life, and for many years, have never given rise to any unpleasant symptoms, and are only revealed in an accidental way when the patient is examined by a physician for some entirely different affection.

More or less precordial pain is one of the first symptoms which direct attention to the failing heart of the aged. This pain may be slight at first, and slowly increase, usually in an intermittent manner, or it may develop suddenly and with great intensity. In the latter instance, ordinarily, it follows overexertion, severe mental shock, or exposure. It is accompanied with marked intermittence or irregularity of both pulse and heart beats. These symptoms may be temporary or lasting. Whenever they come on suddenly, and where some accidental circumstance sufficiently explains their advent, we may be hopeful that with judicious care they will disappear sooner or later. Where, on the contrary, they have developed slowly and somewhat insidiously, they are of serious augury, and usually indicate intracardiac changes, which will probably lead to the development of even graver symptoms. Wherever the lower limbs become œdematous and the serous cavities contain fluid in notable quantity it is very seldom that any therapeutic agents can ward off the approaching fatal termination for many months. We must insist, therefore, upon the great importance of watching carefully the first expression of cardiac inadequacy in old age, and guard against its rapid increase by such means as we have at our disposal. In this place I wish to direct attention to a formula which has long been known as the diuretic wine of the Hôtel Dieu, or Trousseau's wine. It is essentially composed of digitalis, squills, juniper berries, acetate of potash, and white wine. In dessert or tablespoonful doses, repeated from three to eight times in twenty-four hours, I have seen it occasionally effect temporary good results which were very remarkable. Indeed, I have known it occasionally to effect a cure which lasted several years, where the patient was seemingly before its use (and where many other combinations had been previously resorted to without avail) in a very critical condition. Cardiac palpitations and tremor cordis are symptoms of the senile heart which, although distressing, do not as a rule augment the gravity of prognosis. It is a singular fact that cardiac palpitations do not affect old people nearly so often as they do the young. Is this due to the greater impressionability of adolescents, and particularly young women? Tachycardia may be due to some poison, like alcohol, tobacco, tea, or coffee, affecting the pneumogastric and diminishing its restraining influence. In such instances a prolonged period of abstinence will usually effect a decided improvement, and not infrequently a permanent cure. There are instances, however, in which the nervous poison has become so deep seated that the distress and disability to the patient are never entirely gotten rid of. Of course, where the increased action of the heart is dependent upon structural changes, already clearly manifest in the heart itself, we cannot properly expect long-continued benefit from any remedial agents, although even here we should always be willing to recognize how imperfect our mere physical explorations may be, and how often our deductions therefrom are later on invalidated by the patient's evident improvement. I cannot emphasize too strongly the fact that we should never despair, even in advanced years, to secure benefit more or less lasting by the wise use of remedies. Not that we actually delay or prevent the advance of serious disease in these very grave cases, but we certainly do at times give most pronounced relief to the mere functional disablement, and this, after all, is the great rôle of the practitioner in cardiac therapeutics.

I am thoroughly persuaded that very many physicians err grievously in their use of the so-called cardiac tonics. Very often they are given in too large doses; again, they are given in combinations which are unintelligent, mainly because they are "shot-gun" prescriptions, without a definite idea as to what they are doing; and, finally, because no proper appreciation is paid to the physiological effects of combining remedies which possibly neutralize one another's beneficial action. Small doses frequently repeated, simple remedies in a thoroughly assimilable form—these should be essential considerations in our prescribing. Whenever we endeavor too suddenly to give power to an already overtaxed heart the danger is evident that we often actually overstep the mark and cause directly a fatal termination, while with keener medical insight we should be really useful. The bearing of the preceding remarks upon prognosis is clear. Heart disease, not necessarily threatening, managed foolishly by a tyro or an ignoramus, may become very grave, and imminently so. Heart disease, similar in degree and character, managed by the wise, conservative practitioner, has a wholly different outlook. It is too much the fashion of our time in matters of medicine to believe that the same remedies given by two different men will effect the same result. They will do nothing of the sort. Take a very ordinary illustration, and yet one which strikes the mind forcibly, from a very different sphere—viz., the cook and cookery.

A French chef, with his savant gastronomic tastes and education, will produce from a few simple materials an excellent, appetizing, nourishing dish. An ignorant, self-satisfied, and hence daring cook will usually spoil and make utterly uneatable and most indigestible dishes from the very same viands. So it is with good and bad practitioners in affections of the heart. In the one case we see amelioration, great and enduring, perhaps, effected; under different care the downward path is rapid and certain. In instances where we have marked cardiac slowness the intracardiac changes are more frequent than where the heart action is unduly rapid. On this account this condition carries with it ordinarily a graver prognosis. In many instances, fortunately, the gouty dyscrasia seems measurably to affect the slowness of the heart beat, and by proper eliminative remedies we can often accomplish excellent results. I am confident torpidity of the liver in many such cases is a primary factor in this slow heart action. The portal circulation becomes clogged, and the more easily, no doubt, on account of interstitial changes which are present in the liver, just as they are in the kidneys, and are but a development of structural conditions that age produces almost of necessity.

Give minute doses of calomel and soda, gray powder, several times repeated in the course of a week or two, and soon everything which caused immediate anxiety is often greatly improved. For a long-continued course of treatment it is wisdom to abandon the mercurials, and institute in their place frequent doses of podophillin, ipecac, soda, and rhubarb. After such course we shall often see senile hearts practically rejuvenated for a time at least, and a new lease of life and its enjoyment quietly entered upon. In certain examples, where the gouty tendency is clearly defined, and where, particularly, symptoms of angina may be present, I would insist upon the use of Contrexeville water. I esteem that the profession is under obligations to Dr. D'Estrées for his advocacy of this water, and already in my experience I have seen several cases in which the gouty condition has been favorably modified in a very striking manner by its continued use for many weeks. The elimination of uric acid from the economy by its action seems at times exceptionally great. In all cases of senile heart our prognosis should be carefully guarded, and, as Balfour says, we must shrink from dogmatism. If we make too positive statements as to the immediate outcome of the disease we are very liable to be mistaken. There are usually so many modifying and attendant factors to change influencing conditions that we should add extreme caution to oui every assertion.

THE MANAGEMENT OF SURGICAL INJURIES TO THE URETERS.*

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Animal experimentation on the ureters has been of great value in laying the foundation for the management of surgical ureteral injuries. The very small size of the dog's ureter, the difficulty with which it is handled surgically, and the frequent occurrence of sepsis, should, however, prevent us from drawing too unfavorable conclusions from the result of this work. Our choice of procedure in the future must be based upon the results obtained on man, and my own cases are reported to add, if possible, to the elucidation of this subject.

Early work on the ureter for the relief of uretero-vaginal and uretero-uterine fistulæ was done entirely by the vaginal route. We are all well acquainted with the classical operations as performed by Sims, Simon, Landau, Schaede, Pozzi, Bandel, Emmet, Dührssen and others.

In the following case of uretero-vaginal fistula I followed the excellent method advised and successfully performed by Kelly,[1] April 27, 1897 :

Case I.—Miss J. T., aged thirty-nine years. In December, 1896, I performed a vaginal hysterectomy for double pyosalpinx, using double clamps to control the vessels, and a gauze drain. The patient complained of pain in the right loin and down the course of the ureter after recovery from the ether. The urine was fair in amount and normal in appearance. Clamps were removed in forty-eight hours. At this time the patient was somewhat, but not entirely relieved. Gauze was removed on the fourth day. The patient still complained of pain as above. On the sixth day the urine began to flow through the vagina, and the pain was entirely relieved. A good recovery followed, but a urinary fistula remained; and by injecting sterilized milk and by the cystoscope it was found that the urine came from the right ureter through the vagina. Operation was undertaken on July 27, 1897, to turn the opening of the ureter into the bladder by the vaginal route.

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* The complete paper will be found in the Transactions of the American Gynecological Society, vol. xxiv., 1899.

A narrow strip was denuded on the posterior wall of the vagina and around the side, as close to the scar left by the vaginal hysterectomy and ureteral fistula as possible. A curved incision was then made, beginning at one end of the denudation on the right side and ending at the denudation on the left side. The convexity was toward the ureteral opening; the cut was curved through the vaginal wall and into the bladder. This made a flap turning toward the ureter. The concave edge of the incision was covered by a running stitch of No. 1 catgut, bringing the bladder mucosa to the vaginal mucosa.

The convex edge of the incision was stitched by interrupted silver-wire sutures to the denudation and to the sides and posterior wall of the vagina, eight stitches in all being inserted. The bladder was distended with boric-acid solution. No leakage occurred, and a gauze drain was placed in the vagina. Catheterization was practised every four hours, and the bladder was washed with boric-acid solution during the after-treatment.

On the fourth day there was pain from the spasmodic contraction of the bladder. Some clots were expelled through the urethra, and quite a brisk hemorrhage occurred. This was due to the giving way of the catgut stitch that was buried in the bladder and from rough washing of the bladder. A gentle current of hot boric-acid solution, kept up for four hours, controlled the hemorrhage, and the patient then made an uninterrupted recovery, with perfect control of the urine.

At the only visit to her after her discharge from the hospital she claimed to be perfectly comfortable. The vagina was very little shortened, and she could retain urine all night. She had then been at work for two months. She failed to keep her promise to return and undergo a cystoscopic examination.

Many operations have been devised to secure continuity of the ureter after injury resulting from surgical operations, which may be conveniently arranged under the following heads:

1. Invagination of the proximal into the distal end. 2. Transverse end-to-end anastomosis. 3. End-to-side anastomosis (Van Hook). 4. Oblique end-to-end anastomosis (Bovée). 5. Implantation into the bladder. 6. Implantation into the bowel. (See original paper.) 7. Crossed anastomosis—*i. e.*, switching the ureter into its fellow of the opposite side.

These methods are adapted for the cases in which injury to the ureter has been discovered at or immediately after an abdominal operation, or when failure occurs after the vaginal operation for uretero-vaginal fistulæ has been given a thorough trial.

INVAGINATION OF THE PROXIMAL INTO THE DISTAL END. Poggi,[2] as early as 1887, did a successful anastomosis on several dogs by this method, and perfect healing occurred without leakage or constriction of the tube.

Some time elapsed until Tuffier[3] and Budinger[4] (1893 and 1894) repeated these experiments, though with extremely unsatisfactory results in every case, the animals dying of peritonitis in many cases and the ureter being stenosed in those in which union occurred. Bovée points out that fault may be found with both these latter operators in that they tied the ducts before operation and united them afterward, thus injuring them and encouraging constrictions and fistulæ.

Aside from my own cases, three in number, in which this method was carried out, I can find but two other cases reported in which it was adopted in the human subject. These are reported by Robson[5] and Winslow.[6] Their technique corresponds very closely with my own, except that they found it necessary to make a short, longitudinal cut in the distal end of the ureter, to facilitate invagination of the upper end. In my own cases this expedient was not necessary, as the tube was considerably dilated and invagination made easy. My own cases are as follows:

CASE II.—While operating for abscess of the left ovary and fibroid of the uterus, on September 24, 1894, the left ureter was tied and cut transversely just above the brim of the pelvis. When the ovary was drawn up what appeared to be a large vein presented itself, but did not bleed. A probe was inserted into it and passed down over the fibroid into the bladder, proving it to be the ureter, pushed up by the growth of the fibroid and passing over it and under the ovarian abscess. The proximal end of the ureter was found included in the ligature that held the ovarian vessels. The distal end was secured with artery forceps and carefully separated from the fibroid. The tumor and uterus were drawn to the right side, and the ureter, with all the peritoneal attachment possible, was separated and drawn to the left. A pan-hysterectomy was then performed as rapidly as possible. The injured ureter was found quite dilated; the proximal end was made free, and the part injured by the ligature was excised and two fine catgut stitches passed through it, so that when both ends of either stitch were made tense the loop became taut against the mucous surface of the proximal end of the ureter. The stitches were then passed into the distal end of the ureter and brought out about half an inch lower down the ureteral wall. When drawn on the proximal end was invaginated into the distal end and the stitches were tied. Four fine silk stitches were now taken, joining the distal end to the muscular and serous coat of the proximal end. The peritoneum was brought together over the ureter, where it was joined and sewed with fine silk. An iodoform gauze drain was placed over the ureteral joint and down into the vagina. The abdomen was closed after the usual toilet. The operation took two hours and fifteen minutes. During the first forty-eight hours a retention-catheter was used, and after this the urine was drawn every four hours for forty-eight hours; then every six hours for seven days. After this the patient passed urine voluntarily, and the iodoform gauze was removed on the fifth day. No urine leaked, so far as could be ascertained, and the recovery was uneventful. The patient is now living, and claims to be in good health.

Case III.—On December 2, 1894, in operating to remove multiple fibroids which extended to the ensiform cartilage and were extensively adherent to the viscera and omentum, the left ureter was tied and the right cut off. These grave injuries were not discovered until twenty-four hours after the operation, when the abdomen was again opened and the ligature tying the uterine artery and left ureter located. This was freed and the artery secured in another ligature. The right ureter was then found, the proximal end being tied and the distal end curled down under the peritoneum. There was no trouble in uniting them in the way described in Case I., but as the cervix had not been removed a glass drainage-tube was placed in the abdomen. The second operation lasted one hour, and was more than the patient could bear. She gradually failed from shock, and died in about ten hours.

Case IV.—On March 10, 1895, while assisting a colleague to remove a large fibroid that was extensively adherent, when he tied and cut the round and part of the broad ligament, the author noticed what appeared to be a large vein that did not bleed. On calling the operator's attention the latter passed a probe into it and showed that it was the ureter. The procedure that had succeeded so well in Case I. was suggested, and at the request of the operator was performed by the author. The operation was performed exactly as in Case I., and the drainage was managed as before. The after-treatment was about the same, and the patient made a good recovery.

One year later a cystoscopic examination was made, and the urine was found coming from the ureter that had been injured and repaired. In 1898 the patient reported and was in good health.

Transverse End-to-end Anastomosis. Seven cases of transverse end-to-end anastomosis have been reported.

The method consists in bringing the ends of the transversely cut ureter together, holding them in place with two rows of interrupted silk sutures, and covering the field of operation with peritoneum. Pawlik[7] united the ureter over an elastic catheter, which held both ends together and passed out through the bladder and urethra, while Tauffer[8] in his two cases placed a catheter, with a string tied about its middle, in each end of the ureter, inserted his stitches, and withdrew the catheter by the string before tying the last three sutures.

Three deaths resulted from these operations.

Schopf,[9] who performed the first operation by this method on June 12, 1886, lost his patient from tuberculosis seven weeks after the operation. The post-mortem examination showed that good union had taken place in the ureter, which was, however, constricted and surrounded by dense, cicatricial tissue. Pawlik's patient died fourteen hours after the operation, from peritonitis. The sutured ureter was patulous, and did not allow the escape of fluid even under high pressure. Hochenegg[10] unfortunately lost his patient on the twentieth day from a fatal hemorrhage. The autopsy showed the ureteral sutures intact. The origin of the hemorrhage was not ascertained.

On the other hand, Tauffer (two cases), Fritsch[11] and Cushing[12] had successful results.

End-to-side Anastomosis. This method was conceived and successfully experimented with upon dogs by Van Hook.[13] The object is to facilitate the operation of anastomosis and prevent constriction at the line of union. Bloodgood[14] repeated Van Hook's experiments successfully on a large dog, verifying all that Van Hook had claimed for this method. He found on killing the dog two and a half months later that the ureter had perfectly healed, with no constrictions of its calibre. Briefly, the method consists in ligating the distal end of the ureter and making a longitudinal incision through the wall of the tube just below the ligature. The proximal end of the ureter is slit up about one-quarter of an inch, to prevent subsequent stenosis A suture of catgut, threaded on both ends, is passed through the wall of the proximal end, forming a loop on its inner side, and both ends carried through the longitudinal slit in the distal end of the ureter, emerging from the ureteral wall one-half inch below. Traction on this suture accomplishes invagination of the upper end into the longitudinal slit.

Kelly,[15] Emmet,[16] and Doherty[17] have performed this operation on man, with most successful results.

Oblique End-to-end Anastomosis. The oblique end-to-end anastomosis has been advised and carried out successfully in one case by Bovée.[18] His technique consists in cutting the ends of the ureter obliquely. Accurate approximation is obtained by inserting a rectangular stitch, followed by an interrupted suture, and so alternating. This method also has the advantage of preventing stenosis, and requires less loss of ureteral length than Van Hook's method—a point of considerable importance in some cases.

Implantation into the bladder has been performed intraperitoneally and extraperitoneally, the former ten times, with no deaths, the latter four times, with one death.

The intraperitoneal method, first performed by Novaro[19] in 1893, has since been practised by Penrose,[20] Krug,[21] Kelly,[22] Krause,[23] Boldt,[24] Ferguson,[25] Baldy,[26] and Fullerton,[27] and the following case is now added:

Case V.—In 1895 a patient presented herself with uretero-vaginal fistula, which she claimed resulted from a vaginal hysterectomy done two years previously. She further claimed that eight attempts had been made at repair through the vagina. By means of Kelly's cystoscope and bougies it was proved that the right ureter was the one that had been injured. On October 12, 1895, the abdomen was opened and a very careful search was made for the end of the ureter. The free oozing of blood obscured the field and made the search most difficult. Finally, on searching above where the ureter crossed the iliac vessels and raising and cutting through the posterior peritoneal surface, the ureter was found. By now pulling it taut it could be traced into the pelvis, but the distal end was not found. The peritoneum was opened as far as possible, with guidance of the tension; it was cut free and the ureter raised. Splitting the end, it was implanted into the bladder in the same way that Penrose and Krug had practised so successfully. The traction suture was placed as advised by Van Hook in his method of anastomosis. The patient's condition was poor, and time could not be taken to cover the ureter that had been laid bare. Hurriedly opening through the vagina, an iodoform gauze drain was inserted and the operation finished. The patient went off the table very low. A retention catheter was kept in the bladder, and every means was employed for days to keep the patient alive. On the sixth day drainage was removed. There was no leakage of urine. A very slow recovery was made, and after five months the patient left the author's care. She has reported from time to time, and seems and claims to be in very good health, but will not consent to a cystoscopic examination.

In the extraperitoneal method of bladder implantation reported by Baum,[28] Witzel,[29] Veit,[30] and Kelly (*loc. cit.*) each operator followed a different procedure. The method suggested by Fritsch, and carried out by Kelly in a case of uretero-vaginal fistula, is an advance over the other methods, and should supersede them as well as the intraperitoneal route, when possible. The abdominal incision is made inside of the anterior superior spine of the ilium, ending near the spine of the pubis. The peritoneum is dissected loose from the pelvic wall down to the ureter, which is severed and anastomosed with the bladder. If this cannot be done without too much tension the bladder can be freed from its peritoneal attachments and drawn out, as Kelly found necessary. The death of Kelly's patient was due to sepsis, the discharge from the ureter was infected and contaminated the field of operation.

The first consideration in regard to surgical injuries to the ureter can always be made before the operation. The exact condition of the urine must be ascertained. With aseptic urine less importance may be attached to the local chemical action. With urine showing the slightest contamination every care and treatment must be followed to correct it before operating. In urotropine we have an excellent agent for correcting vicious urine.

When extensive operations are about to be undertaken, the passage of bougies into the ureters cannot be too highly commended as a means of preventing injuries. Most of the injuries during abdominal section have been due to a displacement of the ureters by a tumor or tumors arising deep in the pelvis and pushing the broad ligament apart and displacing the ureter, or to carcinoma involving the broad ligaments. Therefore, when tumors are situated and grow as above described, or when there is extension of carcinoma into the broad ligament, special care must be taken to locate the ureters and carry them well out of the field of operation before tying and cutting. All vessels should, as far as possible, be isolated and tied, mass ligatures being avoided. Before working deep in the pelvis the bladder should be thoroughly separated from the uterus, toward and down to the vagina, and held well up by a retractor, the ureter being carried with it, and thus kept comparatively safe.

The ureters can often be located by the fingers or by seeing the peristaltic wave. If in doubt whether or not the ureters have been ligated, it seems wise, as suggested by Kelly, to make a small, longitudinal slit in the wall of the ureter, and, passing a probe up or down, make sure, the slit being taken care of as described later. If one fails to locate the ureter deep in the pelvis it can almost always be found where it crosses the iliac vessels by nicking the peritoneum. When found, a gentle traction will indicate its location for a considerable distance.

By the above means injuries can very often be avoided when doing extensive operations by abdominal section. Since adopting them the author has had no accident to the ureters. When injuries do occur they may be of various kinds and degrees: 1. Longitudinal slits or tears. 2. Nicking out a piece from one side. 3. Partial, transverse division. 4. Complete transverse division. 5. Resection of a portion of its length. 6. Tying. 7. Separation of the fibrous coat of the ureter. Longitudinal wounds should be carefully stitched, taking in the serous and muscular coats, but not including the mucosa. Over this it is very important to stitch the peritoneum carefully. If this cannot be done a graft of omentum or even bowel will add to the safety of the union.

When a piece has been nicked from one side the method proposed by Fenger for stricture of the ureter will be suitable if there has not been too much loss of tissue. In the latter case it would be better to make the division complete, and then make an anastomosis or bladder implantation, according to the location of the injury. This is justifiable and advisable on account of the splendid results that have followed anastomosis and implantation into the bladder. There is less liability to stenosis, and it can be as quickly done as stitching, without complete division.

The repair of complete transverse wounds of the ureter has been looked upon as very likely to fail on account of the failures in experimental work on animals.

The results on man clearly show that failure is the exception. Transverse end-to-end anastomosis has to its credit seven cases, with recovery in so far as the ureter was concerned. It is true Schopf's case died of tuberculosis; Pawlik's of peritonitis, and Hochenegg's, on the twentieth day, of hemorrhage. Still, it would be far-fetched to argue that the method of repair was in any way responsible for the result in those cases. The remaining four cases made good recoveries.

Oblique end-to-end anastomosis with rectangular stitches, as practised by Bovée, gave a good result in the only case reported. End-to-end anastomosis, according to Van Hook's method, has succeeded in the three cases of which a report could be found.

Invagination of the proximal into the distal end has been uniformly successful—only one death (the author's case), in a patient in which the injuries were not discovered until twenty-four hours after the first operation. The abdomen was opened again as the only resource. Under these very unfavorable circumstances the passages through the ureters were established, as was proved by the drawing of six ounces of urine from the bladder from the time of the second operation until death, the bladder having been dry from the end of the first operation until the second was done. It seems clear that the death in this case was due to the second opening of the abdomen, and could not in any way be laid to the anastomosis of the ureter. On the other hand, it cannot be held that the anastomosis was a success.

All the other cases were successful. The invagination was easily made in the author's cases by the method already described. In the cases of Robson and Winslow a slit was made in the distal end, to allow the proximal end more easy entrance. Gentle dilatation could be practised in case the proximal end did not enter easily. Bovée has shown that about an inch can be gained in this way. Certainly very sufficient for practical purposes.

The choice of a method in the repair of resection of a portion of the length of the ureter will depend upon the location of the injury and the amount of the ureter resected. In the end-to-side anastomosis there is a good prospect of success if the amount of tissue used in tying off the distal end and invagination of the proximal into the slit below does not cause too much tension in the already shortened tube. Anastomosis by invagination or the oblique end-to-end anastomosis saves some valuable tissue and gives equally good prospects of success.

The outer fibrous sheath of the ureter carries its chief blood-supply and is closely connected with the peritoneum by fibrous bands. In stripping up the peritoneum over the ureter this sheath is easily injured, and necrosis of the ureteral wall may result. The repair of this injury, as well as the tearing off of any of the peritoneum over the ureter, should receive especial attention. Before closing the abdomen the ureter should be well covered by the surrounding peritoneum, and if this is not possible the omentum or a portion of the bowel made to fill in the exposed area.

Intraperitoneal implantation into the bladder has been reported nine times, and with one of the author's makes in all ten successful cases. This is certainly the operation of choice when the injury is below the pelvic brim and the ureter can be made to meet the bladder without too much tension. If too much tension is required to make the ureter and bladder meet, Kelly's suggestion and practice of separating the bladder from the rami of the pubis and stitching it higher in the pelvis, as practised by Baldy, is a most excellent plan of overcoming the difficulty.

Implantation into the bowel could only be considered when it is found impossible to make a union of the ends of the ureter or an implantation into the bladder. That this procedure exposes the patient to serious complications can hardly be doubted; however, great improvement in techinque has been made by Fowler, who reports one successful case. Martin, of Chicago, has lately reported some experimental work on dogs, and we may eventually get a method by which this procedure can be made comparatively safe.

Theoretically, it would appear to be wiser to try implantation into the other ureter. Implantation on the skin can be used to gain time and a secondary procedure taken later.

Tying the ureter, with a chance of atrophy of the kidney, seems to me a most unsurgical procedure.

Nephrectomy has been often and successfully practised, but in the light of the splendid results of repair after anastomosis or implantation must certainly be a last resource.

CONCLUSIONS. 1. Surgical injuries to the ureters during extensive operations on the pelvic and abdominal viscera are comparatively frequent, and are found to occur most often during vaginal hysterectomies.

2. These injuries can often be prevented by especial care both before and during the operation.

3. In uretero-vaginal fistula great care must be taken to have the urine aseptic before undertaking an operation for repair.

4. In uretero-vaginal fistula repair through the vagina should be first tried. Failing in this, extraperitoneal implantation into the bladder is to be preferred.

5. When injuries occur during abdominal operations, immediate repair by anastomosis or implantation should be undertaken. If the condition of the patient is low, implantation on the skin should be done with a view to future operation.

6. When anastomosis or bladder implantation cannot be accomplished, implantation in the other ureter or bowel are preferable to implantation on the skin.

7. Tying the end of the ureter, with a view to atrophy of the kidney, is not advisable.

8. Nephrectomy should only be practised as a last resort.

9. The results of the different methods of uretero anastomosis and bladder implantation have been about equally successful.

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THE NATURE OF PARAMYOCLONUS MULTIPLEX.[1]

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In the year 1882 Friedreich, under the above title, reported a case of peculiar spasm of the voluntary muscles, and from time to time since then other cases resembling it have been reported. The clinical picture presented to us by these cases has, however, varied very much in detail, as does also the description to be found in the various text-books. For example, the spasm is described as tonic, clonic, and as a fibrillary tremor; as involving the muscles symmetrically and irregularly; as involving the muscles irregularly and successively; as most common in the face and upper extremities; in the extremities and trunk, in the hips and trunk; as beginning in the legs, and subsequently involving the trunk; as confined to the limbs, and as occurring in paroxysms lasting from a few minutes to several hours. The contractions are said in the clonic form to vary from 50 to 150 per minute. These contractions are said to be painless, and to cause intense suffering, to cause only slight twitching and violent muscular movements, to continue during sleep, to be sometimes arrested by voluntary movements, to be increased by mental excitement, and to follow cutaneous irritation. The reflexes are exaggerated.

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[1] Read before the Brooklyn Society for Neurology.

The etiology of this condition is also very vague. It is said to occur most often in males between fifteen and sixty; that it is not hereditary, nor as a rule is there any personal or family neurotic history. Fright and other violent emotions, injuries, severe muscular exertion, rheumatism and malaria are the ascribed causes; but these are so common and the condition so rare that at best we can only consider them as exciting causes.

Even admitting, then, that the variations in the character and situation of the spasm are not incompatible with the existence of the same pathological condition, it is evident that from the descriptions of the disease and of the assigned causes that it is an open question whether we are dealing with a separate affection, or, as believed by some, that it is but a form of hysteria.

The writer's attention has been directed to this subject by the occurrence of three cases which have come under his care and which may be classified under this head, and from a study of these and of those which he has been able to collect he hopes to throw some light on the character of this disease.

Case I.—Male; nativity, United States; aged thirty years. No family history of importance. At the age of four years he received a simple, depressed fracture of the skull, which rendered him unconscious for a short time. He had no further trouble until twelve years ago, when he suddenly developed headache, vertigo, delirium, and coma, followed by paraplegia and anæsthesia of the feet and legs. This condition disappeared in a few days. Eight months later he suddenly developed a coma, which lasted six weeks, and was followed by painful tonic spasm in the muscles of the lower part of the back, hips, calves, and anterior tibials. This attack also disappeared in a few days. His present attack is of eight years' duration, for six of which he has been under observation. He has every day one or more attacks of painful tonic or clonic spasms, situated in the calves, right anterior tibials, glutei, and lumbar spinal muscles. These attacks last from twenty minutes to two hours, and occur during sleep. They are increased by excitement and sometimes diminished by voluntary movement. At times, upon attempting some voluntary movement, the right arm will be momentarily fixed by a tonic spasm of all its muscles. All his reflexes are increased. Above the left orbit is a shallow depression the size of a half-dollar.

CASE II.—Male, aged fifty-two years; nativity, English. Previous family and personal history negative. Three years ago he fell down a short flight of steps, but, as far as can be ascertained, sustained no physical injury. During the next few days he suffered from vertigo, headache, and somnolence, which were followed by painful clonic and tonic spasms in the calves, anterior tibials, thighs, hips, and lower spinal muscles. These spasms are always present in one of these groups, and frequent paroxysms occur in which all these groups are involved. They occur at night, and are not influenced by voluntary movements. All the reflexes are increased.

CASE III.—Male, aged fifty-three years; nativity, United States. Family and previous personal history are unimportant. At the age of twelve years he received a blow on the head, which left a scar just above the right orbit. Eight years ago he commenced to have at irregular intervals attacks, often lasting several months, of slight, rapid clonic spasms, situated in the calves, anterior tibials, and quadriceps extensor muscles. These occur during sleep, are increased by excitement, and can be momentarily arrested by vigorous voluntary movements. All his reflexes were exaggerated.

CASE IV. (Friedreich).—Male, aged fifty years; has phthisis. Present trouble followed fright. There were bilateral non-isochronous clonic spasms of the humeral muscles, long supinators of the hands, and femoral flexors and extensors. The paroxysms occurred at intervals of fifteen minutes, and varied from forty to fifty contractions per minute. The spasms ceased during sleep, but the patient was always awakened in the morning by a painful flexion of the thighs. The spasms were arrested by voluntary movement, and all the reflexes were exaggerated.

CASE V. (Marie).—Male, aged fifty-two years. He contracted a chancre at the age of twenty, but had no subsequent symptoms. He married at thirty-four, and has had healthy children. At the age of twenty-seven he was suddenly seized with dull pains in the arms and shoulders, and these limbs felt heavy and cold and his legs weak. This was followed by vertigo, coma, and delirium. He then developed slight clonic spasms, lasting several seconds and recurring at intervals of several minutes, in the muscles of the thighs and back. These cease during sleep, are increased by excitement, and follow cutaneous irritation. All the reflexes are exaggerated.

CASE VI. (Starr).—Male. Previous health good. Strained himself in lifting a heavy box. This was followed by a pain in the right shoulder and convulsions. He then developed clonic bilateral spasms of the muscles of the trunk, and, after twenty-four hours, in the limbs. These were not controlled by volition, and were increased by excitement and cutaneous irritation. The reflexes were increased.

CASE VII. (Charcot).—Male, aged fifty-two years. At the age of twenty-seven he had an attack of severe pain in the legs. Three years ago these pains returned, with pains in the arms and shoulders, associated with sensations of numbness and cold in the morning. In August, 1885, he had an attack of vertigo, followed by delirium. He then developed clonic spasms in the muscles of the thighs and back. These spasms varied from 100 to 150 per minute, ceased during sleep, and were controlled by voluntary movement.

CASE VIII. (Owen).—Female, aged thirteen years. Scarlet fever at the age of three years. She has always had twitching of the facial muscles, which has gradually spread to the neck, shoulders, upper abdomen, diaphragm, and back. The spasms of the face and trunk alternate, are clonic in character, and are partially controlled by volition. All the reflexes were exaggerated.

CASE IX. (Schutte).—Male, aged fifty-two years. No family or previous personal history. Eight years before he fell, striking his head, which was followed by weakness, vertigo, and feeling of cerebral pressure. This was followed by a hysteroneurasthenia, which gradually improved until all the hysterical symptoms had disappeared. He then developed fibrillary tremors and clonic spasms in the trunk and limbs. The spasms disappeared during sleep, but the tremors continued. All the reflexes were exaggerated.

It will be seen, then, from the histories of the above cases that, contrary to what we find in three-fourths of the well-recognized cases of hysteria, we have a condition which is by far more common in men and in patients who give no personal or family neurotic history, or of vicious habits or diseases in the parents which predispose to neuroses in the children; but, on the other hand, it is equally true that hysteria can arise *de novo* in healthy nervous systems, and this is especially true in traumatic cases. It is also true that every form of hysteria does not as readily occur in men as in women, and that we are more apt to find peculiar types. The absence of a predisposition, therefore, does not militate against this condition being one of the manifestations of hysteria. Examination of the personal histories shows in two of the cases previously existing conditions which not infrequently lead to outbreaks of hysteria—*i. e.*, syphilis and phthisis. In five, traumatism, such as injury to the head, is the apparent exciting cause; in three, a severe muscular strain; in one, a distinct history of fright, and in two, no exciting cause can be ascertained. It will be seen, then, that as to the etiology of these cases there is nothing to contradict the assumption that this is a hysterical condition, and this hypothesis is further supported by the fact that the most frequent assigned causes—injury and fright—are also the most frequent causes of hysteria.

Examination of the history of the present condition shows that it was in three cases preceded by such severe cerebral symptoms as headache, vertigo, convulsions, delirium, and coma, the latter lasting in one case for six weeks; that they were recovered from completely, and in the first case were repeated or followed by well-marked hysterical conditions of anæsthesia or paralyses, or by the present trouble. In two it was preceded by a condition of hysteroneurasthenia; in one it was congenital, and in the remaining three there were no recorded symptoms intervening between the cause and the paramyoclonus. The previous history, then, of such grave cerebral symptoms and of paralyses and anæsthesia, which were completely recovered from, is quite sufficient to exclude anything but hysteria.

The character of the spasms does not militate against these being of organic origin; but if this is true we should be able to locate the lesion in one of the motor levels. Spasms of spinal origin may occur in any part of the body, are usually symmetrical, involve the muscles irregularly, are diminished or arrested by voluntary movements, continue during sleep, and all the reflexes are increased. In the cerebral type they usually begin and are most marked in the arms and face, are often unilateral, involve groups of muscles, are increased by voluntary movements, cease during sleep, and the reflexes are unchanged (Gowers). It will be seen, then, that judging from the character of the spasms that in five they were of spinal origin, but in four of these this was secondary to cortical disturbance, and therefore should be classed as cerebral; and of the remaining four, three are clearly cerebral and two present a mixture of both types. It may be assumed, then, that we are dealing with a functional cortical condition, as we have no evidence of any organic condition, which, if it is not hysterical, is certainly of the same kind and origin. The theory that this is not a hysterical condition rests upon the following hypothesis: That these cases present no family neurotic history, no physical or psychic stigma of hysteria, and that the clonus does not involve associated muscles, and cannot be imitated.

Concerning the first hypothesis, it has already been shown that its occurrence is not sufficiently constant to warrant the assumption of an absence of neurotic family tendency. In answer to the second, five of these nine cases clearly show their presence. In answer to the third, it has also been shown by the character of the spasms that they may at times involve associated muscles, and they are as easily imitated as those of catalepsy or astasia abasia, which are now recognized as hysterical conditions.

To sum up, then, we have a condition in which the absence of heredity does not contradict its being of hysterical origin, whose etiology is that of hysteria, whose symptoms are those of hysteria, and in which there is nothing to prevent the present condition being considered as hysterical; and, further, if we are not to classify this condition as hysterical we are driven to the assumption that we are dealing with a condition which is at one time hysteria and at others not.

PAROTITIS IN OLD AGE.

REPORT OF A PROBABLE CASE.

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It has always, almost without exception, been taught that parotitis is a disease limited to childhood, seldom or never occurring in infancy or old age. Among the reasons given for this, one author (Soltmann) says that in infancy the duct of Steno is too small to permit infection to take place, while in old age the duct is too atrophic to admit noxious matter. Whatever the reason, we know that it is a rare disease in the two extremes of life. Bristowe, in his work on *Practice*, mentions that it may occur in the aged. Aside from this author I have not found any admitting this. Musgrove, of Austinville, Texas, reported a case of parotitis acuta duplex in an old lady of eighty-four years, which ran a regular course up to the sixth day, when she suddenly fell into a stupor, with jactitation and stertorous respiration. She roused from the stupor sufficiently to swallow fluids, but died on the following day (Pepper, *American Text-book of Practice of Medicine*, 1892). I have been unable to find a record of any case of mumps in an old person other than the one reported above, but undoubtedly others have occurred. I report my case in the hope that others of a similar nature will be heard from, and because, so far as I can ascertain, my patient is the oldest on record dying from this disease. The explanation is, to a certain extent, easy. In the first place, the number of persons living to the age of ninety-nine and a half years is limited; secondly, but few persons reaching that age are able to get out and about among people, thus reducing the liability of infection. The question may very properly arise: Did the patient have mumps; was it not a simple swelling of the gland caused by a cold or an injury? My reply is, that the disease ran a course almost identical with the description given by the most prominent authors: The history of exposure, the malaise, anorexia, the chill, and vomiting of the prodromal stage; the discomfort and swelling at the end of two weeks after exposure, the dryness of the mucous membrane of the mouth, the tenacious mucus secreted, and inability to take acid drinks without discomfort. The clinical picture was as vivid, the swelling rapidly extending until the entire ear was surrounded; the inability to open the jaw except to a limited extent; the gradual disappearance and subsidence of the swelling after the fourth day.

My case was as follows:

Tuesday evening, May 2, 1899, I was called to see W. L. R., a retired physician, aged ninety-nine years and six months. During the afternoon he had been engaged in working in his garden, as had been his habit for years. Feeling chilly, he at once went into the house, where he had a severe chill, soon after which he complained of his face. Thinking it was merely a temporary affair, he paid but little attention to it; but as the pain became worse toward night, and some swelling began to show itself, I was sent for. His family informed me that for ten days or more his appetite had not been so good as usual, what little food he did take they were obliged to urge him to take. The patient said he had not felt first-rate for two weeks, had no appetite, felt tired, and during the last few days had been troubled by accumulation of a small amount of very sticky, thick mucus, which was expectorated with difficulty. During the day he had felt nauseated, and all food was disagreeable to him; this culminated in vomiting, after trying to eat a little supper. He complained of quite severe pain about the angle of the jaw and difficulty in opening his mouth. Upon examination I found distinct swelling of the parotid gland just in front of and a little below the right ear, the tumor was sensitive to pressure, and was of a very light rose-color. Pulse 86, full and strong; temperature was not taken, for the patient was not fond of "new-fangled" arrangements; but as the skin was quite cool, it is safe to say that there was but little fever present, if any. The sensitive area was painted with tincture of iodine, a poultice of flaxseed applied, and hydrarg. chlor. mite, gr. one-tenth, administered every half-hour when awake. When I saw him the same evening at eleven o'clock the swelling was much more pronounced and the pain more severe. As the patient was very restless and in considerable pain, I gave him one-eighth of a grain of morphine sulphate, and one three-hundredth of a grain of atropine by the mouth. About half an hour after the dose was given he fell into a quiet sleep, which lasted until morning.

Wednesday morning I found the swelling much increased, while the pain was less severe, but still there was some present. The swelling had extended to such a degree that the right eye was completely closed and the ear was in the middle of the swelling—a condition spoken of by many writers. Compresses wet with cold water were used on the eye at intervals during the day, with the result that œdema had by night subsided somewhat. As the patient was delirious and, consequently, restless, I gave him a hypodermatic injection of morphia sulphate, one-eighth of a grain, and of atropia one three-hundredth of a grain, as a result of which he slept from about eleven o'clock that night until the same hour the next morning. Thursday saw but little change, except that the patient was weaker, and all attempts at feeding by the mouth were abandoned, rectal feeding being substituted. Friday the swelling went down somewhat, and the patient was able to open his right eye to nearly its full extent. Up to this time the heart had been acting well, and the respirations had been full and free; now, however, the first sound of the heart was quite weak and the pulse a little irregular, so stimulants were given. The mental condition did not improve until Friday evening, when the patient called me by name and talked clearly, saying that he had no pain and would like to sit up. I gave the hypodermatic injection the same as the previous night, and he had a quiet night. Saturday he seemed much weaker; the heart was still acting poorly, so nitroglycerin, one two-hundredth of a grain, was ordered every four hours, with the whiskey. Under this treatment the action improved somewhat. The swelling of the gland was going down and the jaw was moved with less difficulty.

About 11 A.M. I was hurriedly sent for, but being in one of the adjoining towns, I did not see him until one hour later. At that time he was failing; the heart was acting poorly again, and the respirations were more shallow. Strychnine, one-fortieth of a grain, was given, with nitroglycerin, one two-hundredth of a grain, resulting in temporary improvement. In spite of all we could do the patient failed rapidly, and died at two o'clock that afternoon.

When the patient was first taken sick the question arose, Where did he get the mumps? On investigation it was learned that there were cases of mumps in town that had not been reported to the board of health, as the regulations require. Just two weeks before he was taken sick the patient attended a public entertainment in one of the churches, where undoubtedly he came in contact with members of a family where mumps existed. Since then several cases of mumps have been reported to the board of health.

A CRITICAL SUMMARY OF THE SURGICAL TREATMENT OF PTOSIS.*

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A complete or partial drooping of the upper lid depends on the inability of the levator palpebræ to properly act, and cannot always be ascribed to the same cause. It may result from the mechanical interference and overweight of hypertrophic skin, lipomata or other tumors, trachoma, inflammation, œdema and emphysema; from spasm of the orbicularis, traumatism and hysteria, as well as from faulty development or disease of the nervous or muscular tissues of the levator. These causes are not equally common; overweight of the lid which requires surgical interference is rare except when due to trachoma; spasm of the orbicularis is still more rare, while paralysis or paresis of the levator as the result of traumatism, disease, or hysteria is not very infrequent. Congenital ptosis is obscure as to its origin, and the actual condition present in any particular case is usually very difficult to decide. The levator may be normal in strength and contractility, but be under the control of a motor nerve not a branch of the third cranial; there may be a central or peripheral lesion or abnormality in its motor nerve, or with no lesion in the nervous supply the muscle may be faultily developed, or the muscular fibres may have undergone degeneration.

A considerable number of cases are now on record in which the paralyzed upper lid moved synchronously with other muscles which have an entirely different nerve-supply from that of the levator. Sinclair,[1] in his classical paper on the associated movements of the eye, arranged the cases which he had collated into groups, which showed the variety of ways in which the levator is sometimes innervated. There were cases of ptosis in which the lid was raised when the mouth was opened or the jaw moved toward the opposite side; others in which the lid was raised when the mouth was opened, but not when the jaw was moved laterally; others in which the lid was raised when the jaw was moved laterally, but not when the mouth was opened; and also cases in which there was no ptosis, although there were similar associated movements of the upper lid with those of the lower jaw. Bernhardt[2] mentions a case in which one eye was opened when the other was voluntarily closed. The number of such authentic cases is sufficient to warrant the assertion that the levator palpebræ is sometimes supplied by a branch from some other motor nerve than that which normally controls it, and that these exceptional branches may be found in association with, or in the absence of, any functional trace of a branch of the motor oculi. Though it has not been demonstrated that in any case there was an actual absence of a branch from that nerve, it has been shown that in the absence of the normal functional activity of that nerve the muscle may retain its strength and contractility, at least when supplied by another nerve.

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The theory that ptosis may be occasioned by a central lesion or abnormality cannot be claimed as proven, although this is possibly the correct explanation in many cases. Bach, Kolliker,[3] and others could not find central changes in the cases of congenital ptosis which were examined by them. Siemerling[4] found changes in the dorsal and vertebral parts of the principal group of cells in the nucleus of the third nerve, but the changes were bilateral, while the ptosis was monolateral, and it has been doubted whether lesions situated as described would affect the branch of the motor oculi in question. Shaw,[5] in a case of acquired monocular ptosis, found the left middle fossa of the base of the brain occupied by a large lipoma, but was unable to discover why the branch of the third nerve which supplied the levator alone was paralyzed. Unless such a central change is a fault of development rather than a result of disease the ptosis is not apt to remain permanently the same, the lesion will probably extend so that other muscles become involved, or retrogress so that the condition becomes improved.

Heredity plays an important part, as is shown by the families observed by Alessi,[59] Duthil,[59] Lawford,[60] Vossius, Fuchs,[3] Gowers[3] and others. This would seem to indicate a developmental fault, and the fault may be sought in the nucleus of the third nerve as well as in the course of the branch to the levator, or perhaps in the development of the muscle itself, and it is of importance to note that Bach had the opportunity to search for such changes in a case of congenital hereditary ptosis, but was not able to find any.

A temporary ptosis sometimes occurs in the course of certain diseases, such as herpes, from involvement of the peripheral portion of the nerve, and, though as yet not demonstrated, it is by no means improbable that a deficiency in the peripheral branches of the nerve may correctly explain the want of nervous impulse in some cases.

Absence of the muscle is frequently quoted as a cause of ptosis; but though the absence of this muscle would be no more surprising than the absence of any other muscle in the body, I am not aware that it has been demonstrated in any of the cases in which the actual condition has been investigated. It has been found to be faultily developed, and the muscular fibres are frequently degenerated. Fuchs and Silex[5] have reported cases of progressive paralysis of the levator not associated with similar paralyses of other muscles, and Mary P. Jacobi[6] has recorded a case in which a ptosis said to have been at first total became at a later period partial.

A partial ptosis may exist without the presence of a gross lesion, and may be amenable to treatment. This is proven by a case reported by Marlow,[7] in which a partial ptosis disappeared when the patient wore the glasses which corrected the refractive condition, but reappeared at once when an attempt was made to do without them.

The treatment of ptosis should be determined by the etiology when it can be ascertained in any particular case. Acquired ptosis should not be subjected to an operation until after a prolonged and thorough course of treatment of the causative disease has demonstrated that there is no hope of the restoration of the functional activity of the levator. Congenital ptosis which is so slight as not materially to interfere with vision should not be subjected to operation; the refractive error, if any is present, should be corrected; treatment should be instituted as indicated by any morbid condition of the patient, while electricity, exercise, and massage may be employed locally. In such a case as that described by Jacobi there should be no interference until after failure on the part of time and any appropriate treatment to give sufficient relief.

The purpose of surgical treatment is to bring the condition of the lid as nearly as possible to the normal, with regard to both movement and appearance; and to do this many operations have been proposed, but, with very few exceptions, they may all be grouped in classes which correspond pretty closely to the etiological conditions, as may be seen by reference to the following tables:

Ptosis may be

1. Acquired from
    - *a.* Overweight of the lid, due to hypertrophy, accumulated fat, or disease.
    - *b.* Spasm of the orbicularis.
    - *c.* Paralysis or paresis due to
        - *α.* Traumatism to the levator palpebræ or to its motor nerve.
        - *β.* Disease, either central or peripheral, of the muscle or of its motor nerve.
        - *ν.* Hysteria.
2. Congenital from
    - *a.* Overweight of the lid.

- *b.* Paralysis or paresis due to
  - *α.* Imperfect muscular development of the levator palpebræ.
  - *β.* Imperfect innervation of the levator palpebræ.

Operations for the relief of ptosis may be classified as:

1. Removal of a portion or shortening of the skin of the lid.
2. Interference with the action of the orbicularis.
3. Advancement or shortening of the levator palpebræ.
4. Substitution of the action of the occipito-frontalis for that of the levator palpebræ.
   - *a.* By indirect union of the tissues of the lid to the tendon of the occipito-frontalis by means of artificial cicatricial tendons or permanent sutures.
   - *b.* By direct union of the tissue of the lid to the tendon of the occipito-frontalis.
5. Substitution of the action of the superior rectus for that of the levator palpebræ.

It is plain that ptosis due to overweight of the lid will be benefited by removal of the excessive weight; that when it is due to spasm of the orbicularis, surgical interference, if advisable, should be directed toward that muscle; that a levator congenitally too long or torn from its attachments demands an advancement or a re-attachment of the muscle; and that in paralysis or paresis of the levator with degeneration of the nervous or the muscular elements the substitution of the action of some other muscle is desirable.

The exceptional operations, not included in the above table, are those for the formation of apertures in the drooping lid for visual purposes, as performed by Gerold,[8] in 1843, and by Szokalski,[9] in 1860, together with tenotomy of the superior rectus, suggested by Argyll-Robertson[10] in 1873.

A number of mechanical contrivances have been devised to support the drooping lid and yield to the orbicularis in winking, but none of them have met with general acceptance as satisfactory.

The best known operation of the first class is the one described by such writers as Beer, Himly and Mackenzie, usually called the old operation. It consists in removing an olive-shaped portion of skin from the lid and closing the wound with sutures. Mackenzie[11] at least strongly urged the limitation of this operation to those cases in which the ptosis depends on an overweight of the lid, but even to this day it is performed in cases where the condition is certainly not dependent on this cause, and where no reason can be adduced from theory or experience as a basis for the supposition that any permanent benefit can be thus obtained, because experience has shown that unless so much integument is removed as to make it impossible to close the eye it will simply stretch and obliterate the tarso-orbital fold.

Hulke,[12] in 1891, described an operation in which he loosened the skin of the lid from the subjacent orbicularis, gathered it into a fold, and retained it there with a suture. Mackinlay[13] suggested the unimportant modification of making three folds of the skin instead of one, but neither of these gentlemen explained what they expected to accomplish. Such an operation temporarily shortens the skin of the lid without reducing its weight, meets none of the indications mentioned, and cannot be of permanent benefit.

In 1863, von Graefe[14] modified the old operation by adding to it the excision of a large portion of the orbicularis, thus combining the first and second classes of operation. Some good surgeons still employ this, and report an occasional good result; but I believe it to be unfortunate that von Graefe's name was ever attached to this operation, for probably that alone has caused it to survive. It can be expected to be successful only when the ptosis is due to overweight of the lid, and should be performed only when this condition is complicated with persistent spasm of the orbicularis—two rare conditions, the combination of which is hardly more than possible.

Some authors, as Fuchs,[15] claim that the name ptosis is incorrectly applied to conditions which do not depend upon an affection of the levator, but the word means a falling of the lid, it has been applied for many years to a drooping of the lid from any cause, and if these authors are right they should also exclude from their lists of operations for ptosis all of those which, like the old operation and von Graefe's, can succeed only in conditions to which they deny the name ptosis.

The only operations primarily designed to interfere with the action of the orbicularis of which I have found a record were the subcutaneous division of the orbicularis, together with the other tissues of the lid, practised by Gerold,[8] in 1843, and the introduction of sutures by Bowman,[16] in 1861, to lift the orbicularis behind the detached skin; but excision of a portion of the muscle has been added by numerous operators to supplement other operations, apparently in a blind hope that thus an additional benefit might be obtained. But it does not appear to have had any material effect on the success or failure of these operations, and it is not clear how it could have much effect except when the orbicularis was in a state of contracture, because when in any other condition the opposition it presents to the action of the levator is so slight as to be very easily overcome.

In 1871, Green[17] described an operation which he had performed for the ruptured tendon of the levator palpebræ, and in 1897, Oliver[18] gave a similar description. As in the case of all ruptured tendons, the proper procedure is to cut down upon the torn ends, free them from inflammatory adhesions, and unite them with sutures—in this case usually to unite the ruptured tendon to the tarsal cartilage.

In the first volume of the *Royal London Ophthalmic Hospital Reports* (1859) descriptions are given of two operations performed by Bowman[19] for advancement of the levator. In the first operation he everted the lid, excised a portion of the tarsal cartilage, with about half an inch of the tendon of the levator, and sutured together the cut edges of tendon and cartilage. In 1888, Boucheron[20] advocated almost exactly the same operation, with the addition of excision of a part of the fibres of the orbicularis, and described its technique very well. In 1891, Heisrath[21] proposed to excise the middle portion of the cartilage without cutting the insertion of the levator, and to unite the remaining portions of cartilage with sutures. Wolfe,[22] in 1897, proposed to evert the lid doubly, hold it in this position, lay bare the levator, isolate its median portion for about 1 cm. in breadth by separating the muscular fibres on each side, elevate it on two strabismus hooks or a small spatula, excise a portion as many mm. long as equalled the difference between the height of the palpebral fissure of the affected and that of the other eye, or that of the normal eye, 10 mm., and unite the cut ends with catgut sutures. The last is an ingenious operation, and its technique is well described by its author; but I am hardly ready to agree with him that "success depends on accuracy of measurement of the palpebral fissure and accuracy of measurement of the portion of muscle resected." It depends much more on the condition of the levator being such that when shortened it is able to act in a normal or nearly normal manner, and when the levator is in such a condition it is difficult to see why equal success might not be obtained by means of Bowman's or any other resection of the tarsus, or of tarsus and levator from the conjunctival side of the lid, if performed with equal care as to the length of the part resected and its correspondence to the degree of ptosis.

The second operation described as performed by Bowman[19] was the excision through a skin incision of an oval piece of all the tissues of the lid except the skin; and in 1891, with more attention to detail, Gillet de Grandmont[23] advocated a remarkably similar operation. He made an incision, 2½ cm. long, 3 or 4 mm. from the free border of the lid, through the skin, dissected up the skin above and below the incision, removed the exposed portion of orbicularis, made an incision through the cartilage, 2 cm. long, parallel to and from 2 to 4 cm. from the free border of the lid, joined the two ends of this incision by a curved one, with its concavity below, through the whole thickness of the tissues. The height of this included area which is to be removed depends upon the degree of ptosis.

Wolfe[22] recommended for cases where advancement from the conjunctival surface was impracticable an operation very similar to the one already described, performed through a transverse incision in the skin of the lid.

In 1883, Everbusch[24] proposed to create a fold in the tendon of the levator, and thus practically advance it without actual section of the musculo-tendinous fibres, and advocated a beautiful and ingenious operation for this purpose.

In 1888, Abadie[25] suggested a crude method of forming a fold in the levator, but he himself pronounced it unsatisfactory.

Snellen,[26] in 1889, and Nicati,[27] in 1890, proposed the introduction of subcutaneous sutures, each in a different manner, for the purpose of folding the levator, or rather the levator and aponeurosis, upon each other; and in 1897, Wilder[28] proposed to fold the tarso-orbital fascia upon itself, together with the aponeurosis of the levator, by means of gathering stitches, and at the same time secure with the same suture a connection between the lid and the tissues above the brow. Wilder's operation is a combination of the third and fourth classes of operations, but the portion which relates to the shortening of the fascia, and so of the levator, is subject to the same criticism as all operations which look to the effect on the levator for their success.

Two years after Everbusch published the operation which bears his name, a modification that he had added in the hope of relieving paralytic ptosis was described by Brugger.[29] It was practically the addition of von Graefe's operation, thus forming a combination of the first, second, and third classes of operation—the excision of skin, excision of orbicularis, and advancement of the levator; but as neither one of these nor the combination can restore activity to the paralyzed muscle or supply a substitute for its action, the effect can be at best only to shorten the lid and passively increase the size of the palpebral fissure, with little reason to suppose that even this effect will be permanent. No operative measure can be expected to give contractile power to an absent, atrophic, or badly innervated muscle, and the only hope of success a surgeon can have who adopts any one or a combination of these first three classes in a case which he considers paralytic is in the chance that he has made a mistake in diagnosis.

An operation of this class is indicated in any case of ptosis in which the levator appears to have contractile power and proper innervation, but to be of too great length properly to raise the lid, and in no other case, for all that can be accomplished in this manner is to shorten the distance between the origin and insertion of the muscle. Thus if used in a proper case it practically brings the levator to its normal condition; but if the levator is for any other reason incompetent the operation can hardly be of great benefit to the patient, as the stretching and yielding of the tissues will be apt to reproduce the ptosis, much the same as after the old operation. The reports of successful results and the failures which have attended these methods of shortening the levator, which when placed thus together show how little they differ, render it not improbable that a levator of too great length is more frequently the cause of ptosis than has been commonly supposed, and demonstrates at the same time that little if any attention has been paid to this important point in the selection of an operation to be performed on an individual case of ptosis.

It is a question which admits of some doubt whether the suggestion to utilize the action of the occipito-frontalis by indirect union of the tissue of the lid to its tendon through sutures or artificial cicatricial tendons was first made by Dransart or Pagenstecher. Dransart,[30] in 1880, proposed to make an incision along the upper border of the tarsus, expose the orbicularis as high as the brow, introduce three fine catgut sutures through the upper margin of the cartilage, carry them beneath the muscles of the brow, then through the muscle into the wound. Here the ends are tied, cut short, and the wound closed. This operation bears a very close resemblance to the one recommended by Meyer,[31] in 1883, as well as to the one in which Bowman suspended the orbicularis in two loops of suture, and it proved no more efficacious. Two years later, a year after Pagenstecher had announced his operation, Dransart[32] proposed another, the one generally known by his name. No incision was made in the skin, but three silk sutures, each armed with two needles, were thus passed. Introduce a needle through the skin and the upper part of the cartilage, carry it up beneath the corrugator supercilii, and bring it out through the skin of the forehead, 3 or 4 mm. above the middle of the brow. Introduce the second needle, attached to the same thread, a few mm. from the point of entrance of the first, cause it to penetrate the same tissues in a course parallel to that of the first until it also emerges through the skin of the forehead. One suture is thus placed in the middle and one on each side, and finally all are tied tightly over a bit of kid, so as to exaggerate the effect. Three years later Caudron[33] described a third operation as performed by Dransart. In this he used two catgut loops, which he introduced with no skin incision just above the adherent border of the cartilage, but without wounding it, brought them out above the brow and tied them.

At the International Medical Congress in London, 1881, Pagenstecher advanced two operations.[34] The first, for complete ptosis, was to carry a strong silk suture from a finger's breadth above the brow subcutaneously to the middle of the ciliary margin, then to tie the ends and tighten the knot daily until the thread has cut through the skin. The second, for incomplete ptosis, was thus performed with a silk suture armed with two needles. Introduce one needle close to the ciliary border, pass it subcutaneously for 1 or 2 mm. parallel to the ciliary border. Re-enter the same needle at the point of exit, carry it up between the tarsus and the skin, taking care not to wound the periosteum, and bring it out above the brow. Introduce the second needle at the original point of entrance of the first and carry it directly upward beneath the skin to the point of exit of the first above the brow, and tie.

The only differences between Dransart's second and Pagenstecher's second operation are that Dransart introduced his sutures a little further from the ciliary border; that he passed them through the cartilage, and that a small portion of the lower part of the suture was not subcutaneous—variations of a very minor character.

In 1882, De Wecker[35] proposed to first perform von Graefe's operation, and then introduce a silk suture about a finger's breadth above the upper margin of the orbit, pass it downward beneath the skin and muscular tissue across the wound, to emerge in the middle of the band of integument between the wound and the ciliary margin; to re-enter the needle at a point separated horizontally 5 or 6 mm. from the point of emergence and carry it up beneath the skin and muscle in a parallel course to its descent, to emerge through the skin of the brow ½ cm. distant from the first. The wound is closed and the lid raised by traction on these sutures. This cannot be considered anything but a combination of von Graefe's and Dransart's third operation, and should never have been called original. In an article published in 1898, Pechin[36] states that De Wecker no longer removes any flap of skin, or of skin and orbicularis, but inserts two sutures only. In that case the only difference between his operation and that of Dransart, as described by Caudron, is in the way he introduces the needles, which place the sutures in almost exactly the same position in the one operation as in the other.

Masselon's operation[37] differs from Pagenstecher's only in that a portion of the suture near the ciliary border is not buried.

Dianoux,[38] in 1886, proposed as a modification that two silk sutures be introduced in such a manner that each formed a loop, one thread of which passed in front of, the other behind, the orbicularis, and emerged at the same point of exit above the brow, where they were tied and tightened daily until they cut through.

Birnbacher,[39] in 1892, proposed to lay bare the cartilage, pierce it at its highest convexity by two needles carrying a single strong silk thread, and then cause them to pass directly upward, to emerge close together in the eyebrow; then to introduce another suture in the same manner on each side of the first at the distance of 7 mm., but to cause them to diverge in their upward course from the central one. They are then to be tied and the wound closed, the sutures to remain twenty to twenty-five days.

Peschel,[40] in 1894, tried to improve Birnbacher's operation by omitting the skin incision, which reproduced Dransart's second operation, with the following rather minute differences: the sutures were made subcutaneous by having the two needles attached to each enter the skin at the same point, and the lateral sutures diverged from the central one as they passed upward.

All of these operations are so closely alike that they may very properly be considered as one, and any just criticism of one is equally applicable to each of the others. The frequent tightening of the silk sutures is painful; the suppuration, encouraged in the hope of producing a better cicatrix, is apt to cause phlegmonous inflammation of the lid; the final result is uncertain, and can in no way be satisfactorily estimated in advance, and a frequent result is a deformity of the lid; but while this operation was not perfectly satisfactory, it was much superior to those that had preceded it, and was productive of many excellent results.

The first mention of the use of a metal suture for the purpose of joining the lid to the occipito-frontalis was made by Gayet,[41] in 1891; but in 1895, Mules[42] brought the following operation prominently forward: Pass two needles with eyes near their points deeply through the tendon of the occipito-frontalis above the eyebrow, downward in the substance of the lid, through a portion of the cartilage, and bring the points out in the margin of the lid posterior to the lashes. Form a groove in the margin of the lid between the needles by a slight incision. Thread one end of a piece of silver wire through the eye of each needle. Withdraw the needles, and thus leave a loop of wire passing from the brow to the edge of the lid and back again, which may be tightened if desired. During the same year Evans[43] proposed to modify Mules' operation by passing the needles carrying the wire from the edges of the lids upward—a not highly important modification. Three years later Mules[44] published a modification of his manner of inserting the wire, with a view to render the operation easier to perform, but not materially changing it. De Beck[45] performs the operation without special needles.

Sutures, whether of metal or other unabsorbable material, if left *in situ* permanently, must become encapsulated in the tissues if they are to be tolerated and produce good results. This happens in a certain percentage of cases, but when it does not occur the suture sets up inflammatory action, of more or less severity, to eject the foreign body from the tissues. Mules' operation is therefore the introduction of a foreign body into the lid as a support, and its success depends upon its perfect encapsulation.

In 1897, Darier[46] proposed to utilize the physiological properties of muscular tissue in the formation of a support to the lid by means of the following operation: Excise a piece of skin 3 mm. broad and as long as the lid, so as to leave the subjacent orbicularis intact. Form two narrow flaps from the tissue of the orbicularis, detaching them everywhere except at their bases. Make an incision 2 cm. long above the brow, dissect free the skin from this incision down to the opening in the integument of the lid, pass the two muscular flaps formed from the orbicularis beneath the bridge of skin, and suture their upper ends to the upper lip of the wound in the brow; then detach the base of each of these flaps and attach it to the tarsal cartilage and the lower lip of the palpebral wound. The criticism of Pechin[36] on this operation is just. The physiological action of muscular tissue cannot be obtained from strips of muscular fibres severed on all sides from their nutrient and nervous supplies, and such strips must be expected to degenerate, atrophy, or slough. At best they can only act as sutures made of any other foreign material.

The first suggestion to seek help from muscular tissue outside the eyelid was made by Mr. Hunt, in 1830.[47] He proposed to attach the skin of the lid to that portion of the skin of the brow upon which the occipito-frontalis acts in this manner. He made an incision just below the eyebrow for the entire length of the lid, joined its ends by another a short distance from the tarsal margin, excised the included skin, and united the edges of the wound with sutures. Middlemore[48] probably voiced the opinion of his contemporaries when he stated in his text-book, issued five years later, that he could not see any difference between this and the old operation. The idea, therefore, failed at the time to be developed, but lay dormant for half a century, until, in 1886, Panas[49] presented the operation which bears his name. Masselon claims that this is only a modification of Hunt's and not entitled to the honor of being known as an original or new operation. The fundamental idea is certainly the same in the two operations, but the development of the idea in the minds of the two men was so essentially different that the two procedures bear no resemblance to each other, and Panas' operation deserves the recognition it has received as original. It has more than once been criticised as complicated and difficult to understand—a just criticism, it seems to me, of the descriptions in the text-books—but as many of the difficulties disappear when the original text is read, I have undertaken to render it freely into English.

Make an incision in the sulcus along the upper border of the tarsal cartilage from one commissure to the other, but interrupted in the middle for the distance of 8 mm. From the inner end of the outer portion of this incision and from the outer end of the inner portion make two parallel incisions upward to the sulcus, which marks the margin of the orbit. Make a slightly curved horizontal incision, 2 cm. long, down upon the periosteum of the margin of the orbit, joining the ends of the vertical incisions and extending slightly beyond them on each side. Dissect up the small median flap thus marked out as far down as its base. Make a final incision, 3 cm. long, just above the brow, parallel to the one at the margin of the orbit, down to the periosteum. With care, to avoid any injury to the periosteum or to the tarso-orbital fascia, dissect up the musculo-cutaneous bridge between the two incisions. The small skin-flap on the lid is then drawn up beneath this bridge of tissue, where it is to be secured by three silk sutures. In the space made bare by the first incision on each side of the median flap a suture is inserted, which includes a portion of the tarso-orbital fascia and of the conjunctiva, but not of the skin, and then both ends of the suture are carried under the musculo-cutaneous bridge and fastened to the upper lip of the incision above the brow. In the drawing which accompanies the article all of these sutures are represented as armed with two needles, both of which emerge over the wound above the brow, where the sutures are to be tied, but in the text the author does not mention how he is accustomed to pass and tie them. If they are fastened as indicated it necessitates the closure of the wound above the brow with a few fine stitches. An over-correction at the close of the operation is to be desired, the sutures left in five or six days, and the eye kept bandaged until the cicatrix is firm. The final result can be seen in from four to six weeks. The object of the lateral sutures is to guard against ectropion, which is apt to be present at the close of the operation unless they are employed. This is due to the relative positions of the base of the flap and the upper edge of the tarsal cartilage, and is not to be seen when the base of the flap is placed lower down over the cartilage.

In 1894, Pergens[50] proposed to modify Panas' operation by making an incision, 3 cm. long, just beneath the orbital margin, dissecting up the skin from the entire breadth of the lid to form the flap, and the skin of the brow to form a pocket to hold the flap. No incision was made above the brow, but the flap was drawn into the pocket by sutures passed through its edge, then up through the pocket, and out through the skin of the brow. After this was done he joined the ends of the first incision by a second, passing 3 mm. above the free border of the lid, and united the overhanging cut edge of skin left by the first incision to the cut edge of skin below the last. This operation resembles Hunt's much more than Panas'. If the skin of the lid be dissected up, as directed by Pergens, the two incisions described will include a portion of skin nearly if not quite freed from attachment to the lid, and the suture of the skin of the brow to that below the long incision in the lid is exactly as Hunt recommended. The difference between the two operations is that Hunt removed the portion of skin included between the two incisions, while Pergens tucked it up beneath the skin of the brow. As a modification of Hunt's operation it was an improvement, because by means of the extensive dissection a broad cicatrix is formed between the occipito-frontalis and the lid. Whether the presence of the transplanted portion of the skin strengthens this cicatrix or not is uncertain.

Hess[51] proposed, during the same year, to make an incision for the whole length of the brow, dissect the skin free from the orbicularis from the incision nearly to the ciliary margin, and fold the loosened skin up toward the brow by means of three loops of silk thread, the ends of which are brought out and tied above the incision. The sutures are left in eight or ten days, and may be tightened from time to time.

In 1895, Tansley[52] presented what he called a combination of the Panas and the von Graefe operations, but this description is not exact. The von Graefe operation consists of the old operation plus the excision of part of the orbicularis, and the employment of the principle on which it is based does not necessarily mean a modification of Panas' operation. Tansley's is really the old operation with a long, narrow flap of skin left attached to the middle of the lower border of the wound, which is slid up beneath the skin of the brow sufficiently high to approximate the edges of the wound, which are then sutured together. It might better be called a modification and improvement of Hunt's operation.

In 1897, Landolt[53] presented the following modification of Panas' operation: Make an incision about 4 mm. above and parallel to the ciliary border, dissect up the skin above the incision to the level of the margin of the orbit, and draw up the skin below the incision into the pocket thus formed by means of three sutures passed through the lower lip of the incision, up through the pocket and out above the brow. The lower margin of the upper lip of the incision may also be turned up into the pocket by means of similarly placed sutures, either as a part of the primary operation, or, as Landolt prefers, as a secondary procedure. The attachment of the skin of the lid to the occipito-frontalis can hardly be equally as good as in Panas' operation, for if the subcutaneous pocket is made only to the margin of the orbit the flap will only touch the insertion of the tendon of that muscle, and its principal attachment will be in the cicatrices formed by the sutures. Æsthetically a fold will be formed about the same as after Hess' operation.

Another modification of Panas' operation was published in 1898 by Van Fleet.[54] Its most essential variation is in the size and location of the median flap, which Van Fleet makes in this manner: "The operator makes an incision into the upper lid somewhat above the superior margin of the tarsal cartilage, commencing at the inner side and including the middle third of the lid. From the inner extremity of this incision another is made down to the ciliary border, and a third is made in like manner from the outer extremity of the first. The integument enclosed by these three incisions is dissected from the underlying tissues down to the ciliary border, and constitutes the flap." From this description it is plain that the line which marks the base of the flap in Panas' operation marks its upper limit in Van Fleet's. The final incision Van Fleet makes in the brow, and the skin only of the brow and lid down to the tarsus is raised to form a bridge under which to draw the flap. This the author claims as one of the distinctive features, and says that the flap "becomes a part of the skin controlled by the occipito-frontalis muscle quite as much as it would had the incision extended down to the periosteum." In Panas' operation the flap is attached to the occipito-frontalis itself rather than to the skin controlled by it, and so it probably is in Van Fleet's, though not with equal certainty. The flap as recommended by Panas is too small; Van Fleet's is far better. The position of the flap in Van Fleet's operation is much the better, because it secures a firmer grasp on the tarsus as well as a better leverage, so that the eversion of the lid is impossible and the lateral sutures unnecessary. With a few slight changes in the technique I believe this to be the most satisfactory in its final results of any operation with which I am acquainted. These changes are to place the base of the flap about midway between the upper border of the cartilage and the ciliary margin, to pass the flap through the substance of the tendon of the occipito-frontalis, instead of just beneath the skin, and to make the upper incision not in the brow but above it, as when made in the brow the hairs are apt to grow in irregular directions and so make the scar very prominent.

The proposal to isolate a muscular flap from the occipito-frontalis and attach it to the tarsus seems to have been made first by Vautrin,[55] in 1890, but I know nothing of his method. Three years later Kunn[56] proposed to expose the insertion of the occipito-frontalis at the margin of the orbit, incise it, elevate the periosteum and muscle from the bone, so as to disconnect all attachments to the latter, and unite the cut edge of the tendon thus freed to the upper border of the cartilage by means of sutures. He described the technique very well.

The fifth class, in which a substitution of the action of the superior rectus for that of the levator is sought, is represented by two operations—one made public at the Société Française d'Ophthalmologie, in May, 1897, by M. Motais,[57] the other at the Société d'Ophthalmologie de Paris, July 6, 1897, by M. Parinaud.[58]

As the superior rectus follows the same course, has the same innervation, and is wrapped in the same fibrous sheath as the levator palpebræ, it seemed feasible to Motais to borrow a portion from the median part of the superior rectus and to suture it to the median part of the tarsal cartilage, and he reported good results from the following:

Evert the lid, hold it up by means of a sharp hook caught in the middle of the cartilage; with another sharp hook fixed in the sclera, 4 or 5 mm. above the cornea, turn the eye well down, so as thoroughly to expose the upper cul-de-sac, and have an assistant hold the two hooks. Make a transverse incision, 10 or 12 mm. long, through the conjunctiva, 6 or 7 mm. above the cornea, so as to lay bare the insertion of the superior rectus. From the middle of this incision make another vertically as far as the upper margin of the tarsal cartilage, and lay back on each side the conjunctival flaps so formed. Divide the subconjunctival cellular tissue and the capsule of the tendon, place a strabismus hook under the tendon, and remove the sharp hook from the sclera. Seize the middle of the tendon, 2 or 3 mm. from its insertion, with fixation forceps, make a transverse incision, from 3 to 3½ mm., at the middle of the insertion, and from each end of this a vertical one running along the tendon for 10 mm., thus forming a median flap 3 mm. broad by 10 mm. long. Take a suture armed at each end with a curved needle, pass each needle through its flap 3 mm. from its free end, ½ mm. from its border, thus securing it in a loop of thread, and remove the strabismus hook. With a pair of scissors cut a buttonhole across the insertion of the tendon of the levator and lay bare 5 or 6 mm. of the anterior surface of the cartilage Pass each of the two needles through the buttonhole, then through the cartilage from the palpebral to the mucous surface, 2 mm. from its upper border, emerging 2 mm. apart. Traction on the thread draws the flap into the buttonhole, and the two threads are tied in a single knot, that the effect may be observed. If this is insufficient the suture is removed and another is inserted, either higher up in the muscle or nearer the ciliary border of the cartilage; if it is too great the opposite course is followed. When the adjustment is satisfactory tie the threads firmly, cut them short, and unite the edges of the conjunctival wound so that the new tendon lies subconjunctivally. Bandage the eyes for two days and remove the sutures on the eighth day.

Attempts to perform this operation on the cadaver have convinced me that it is very difficult as well as delicate, and that a considerable risk is run of causing great injury to the superior rectus without obtaining a satisfactory compensation in benefit to the ptosis.

Motais adds the excision of a flap of skin anteriorly, the reason for which is not clear if this operation is as efficient as he would have us believe.

Parinaud's operation was essentially different. He everted the lid, turned the eye downward, made a conjunctival incision, 12 to 15 mm. long, parallel to the border of the cartilage, and laid bare the globe in the region of the superior rectus by dissecting up the conjunctiva. He then passed a suture, armed at each end with a needle, beneath the tendon in its capsule, at a point more or less high, according to the effect desired. Each end of this suture was then passed through the border of the conjunctival flap, through the tendon of the levator, down between the cartilage and the skin, to emerge at the level of the eyelashes, 7 or 8 mm. apart, where they were tied. The suture was removed on the fourth to the sixth day.

Theoretical arguments pro and con may be urged with regard to this class of operations, but the test of time and experience must be applied before an authoritative judgment can be passed upon it. It is acknowledged that it frequently causes diplopia, but this is claimed to be transient. It is positively contraindicated in all cases in which there is paralysis or paresis of the superior rectus.

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REVIEWS.

TEXT-BOOK OF ANATOMY BY AMERICAN AUTHORS. Edited by FREDERIC HENRY GERRISH, M.D. New York and Philadelphia: Lea Brothers & Co., 1899.

THE difficulties of teaching anatomy, one of the most important of the fundamental branches of medicine, have brought about many changes and modifications of method. How many of these alterations are for the better remains to be seen. So numerous are the suggestions of plans for both teacher and student that apparently it is matter of common belief that some royal road to the mastery of the subject must be found. The recognition of the importance of comparative anatomy and embryology as aids to the proper apprehension and comprehension of certain details usually regarded by the student as dry and meaningless is distinctly a step in the right direction, although the profit which may be derived from these auxiliaries is somewhat impaired by the inadequate preliminary training and pronounced utilitarianism of many of our American medical students. The average student seems to resent being made acquainted with any anatomical facts the practical clinical application of which is not immediately and aggressively obvious. No text-book of anatomy, however, can be looked upon as thoroughly up to the requirements of modern anatomical teaching if it fails to give due weight to embryological and comparative anatomical considerations, and to present the subject in a broad way.

The work here under review in many respects fulfils the requirements of a modern text-book of anatomy. The description of the central nervous system, for example, is based upon its embryology, and the chapter on the digestive system, as also that upon the respiratory system, is introduced by such general biological considerations as will tend to arouse the interest of the student and prove helpful to him by giving him broader ideas of the subject he is studying.

The arrangement of the subject-matter of the book is to a great extent along conventional lines. An introductory chapter deals with definitions of terms, methods of study, etc., and is valuable in that it takes into account a fact which so many text-books disregard—namely, that the beginner knows nothing about the subject. It is also valuable as contributing to "precision of language and of thought," for it is important that the student should early learn to attach its own special meaning and no other to every term used. Following the introductory chapter is one upon the histology of the elementary tissues, and this, in turn, is followed by a chapter upon embryology. After these follow osteology, myology, etc., in the usual sequence. At the end of the volume there is a chapter on "Relational Anatomy," as studied under three aspects—relations as shown by plane sections, by surface views, and by skiagraphs. The last-named form of illustration has been rather largely employed, and suggests many possibilities in the study of an tomical topography. There is also a chapter on "Practical Anatomy," consisting of brief directions as to work upon the cadaver, and hints and references to aid in the study of the part in process of dissection.

A feature worthy of note is the devotion of a special chapter to the description of the fasciæ and another to that of the so-called ductless glands. As students ordinarily seem to have some difficulty with the fasciæ, it may be advantageous to present the subject in this form, although the close relation of these structures to the muscles would seem to require the consideration of the two subjects together. Another feature of the work, and one that is highly commendable, is the indication of the etymology of anatomical names. Although in the main helpful, this practice is not universally so, however, since the exact etymology of a technical term may or may not serve to elucidate its application, the connection between the technical use of the word and the meaning of its root being sometimes so remote as to be merely confusing to the student.

There is throughout the work evidence of effort on the part of the authors to condense the text somewhat, and since the book is intended for students who are studying the subject presumably for the first time, this is to be commended. One of the most serious drawbacks to such students is the use of a text-book of too great fulness, the multiplicity of detail serving to confuse and distract rather than to instruct. Desirable as conciseness may be, however, some parts of the text are disappointingly meagre. This is notably so of the sections on the choroid and retina, and of some parts of the chapter on the digestive system. The chapters on histology and embryology are also so condensed that it becomes a question whether it were not better to allow the student to seek information upon these important subjects in special text-books.

The chapter on osteology is an admirable presentation of the subject, and is written upon broad lines.

The muscles are classified according to their functions, an arrangement which, if not strictly consistent, may be useful as an aid to the student's memory. A commendable feature of this chapter is the omission of the usual matter descriptive of the muscles and of much of that wearisome detail as to origin and insertion, which seems to be regarded usually by anatomical authors as almost sacred.

Many terms belonging to the newer anatomical nomenclature are employed, the older synonyms being given to prevent confusion. The editor is to be congratulated upon having added another to the many methods of delimiting the regions of the abdomen.

The pictorial features of the work are conspicuous, the illustrations being abundant and the use of color generous. The pictures are attractive, but a fault which they possess, in common with those of many, if not of most, anatomical text-books, is their excessively diagrammatic character, many of the cuts being diagrams pure and simple. There is no question of the teaching value of diagrams within certain limits. A well-constructed diagram will sometimes tell a clearer story of structure or relation than the most accurate picture. But this is by no means always the case, and there seems little reason to doubt that the more closely an anatomical picture simulates nature the more valuable it will be to the student. This statement may savor of heresy or of revolution to those who have been wont to regard reverentially the diagrammatic figures in the text-books of their youth, but a comparison of any such illustrations with carefully made dissections will at once reveal their untruthful character.

An examination of the sources of the illustrations would seem to indicate that Testut's admirable *Traité de l'Anatomie* had received in this case that "wide recognition" which the publishers' note bespeaks for it, since of the 950 illustrations about 555 have been taken from Testut's *Traité.* A considerable portion of the remaining 400 are original diagrams. The representations of surface anatomy and the skiagraphs are also original.

In conclusion, it may be said that the work, although perhaps not calculated to afford the same aid to the student of surgical anatomy or to the practitioner of surgery as some of the older text-books, is a valuable addition to the resources of the student of systematic anatomy, and is deserving of the hearty support of American teachers.

J. C. H.

ELECTRO-HÆMOSTASIS IN OPERATIVE SURGERY. By ALEXANDER J. C. SKENE, Professor of Gynecology in the Long Island College Hospital, Brooklyn, N. Y., formerly Professor of Gynecology in the New York Post-Graduate Medical School. New York: D. Appleton & Co., 1899.

THIS book of one hundred and seventy pages, by one of the oldest and most eminent of gynecologists, is offered to the profession as a contribution relating to electro-hæmostasis and the electric cautery in general and special surgery, and as a supplement to the third edition of the author's very popular work on diseases of women. The writing of the book was prompted by the manifest interest of the profession in the subject, because of the writer's employment of new methods of operating in other than gynecological surgery, with a number of recent improvements in instruments and the technique of operating, and after a large experience confirmatory of the value of the principles practised.

The work is composed of an introductory chapter, in which he considers the advantages of electro-hæmostasis over other methods of hæmostasis; a chapter on the description of instruments; one on the macroscopical and microscopical results of the electro-hæmostatic process, followed by eleven chapters describing the use of the electric cautery for hæmostatic purposes in a large number of operations of special and general surgery; and, finally, two chapters are devoted to asepsis and antisepsis in surgery.

In the introductory chapter the catgut and silk ligatures are broadly and, we think, most unjustly condemned, for surely most modern surgeons have little cause for complaint against these ligature materials. It was from unfortunate experiences with the catgut and silk ligatures that the writer sought to discover a better method of controlling bleeding, and that he adopted electro-hæmostasis. In the chapter on the results of this hæmostatic process, which is most interesting to surgeons, the macroscopical and microscopical changes in the desiccated tissue are described. Laboratory experiments on the ovaries, the Fallopian tubes, appendix vermiformis, ureters, and other canals lined with mucous membrane determined that the tissue on which electro-hæmostasis is practised is rendered amorphous by heat and pressure. The lumen of an artery was shown to be completely obliterated, so that no trace of its original structure could be found, and even though twice the normal blood pressure were applied the opening of the vessel remained closed. Nerves are devitalized, and hence there is less pain and irritation in the stump. Other advantages are that electro-hæmostasis sterilizes the parts involved, and therefore the operation is perfectly aseptic; the pedicle is in a condition requiring the least reparatory care, so that recovery is more prompt, uneventful, and complete.

Dr. Skene has now employed electro-hæmostasis in over two hundred abdominal operations and in many vaginal hysterectomies and other operations, and has never had secondary hemorrhage in any of them. The chapters on aseptic and antiseptic technique describe the very good conditions under which the writer's operative work is done. The book is well written, and the illustrations are exceptionally good, and assist greatly in elucidating the text.

Although the principles advocated in this book are accepted by but few of the profession, it is nevertheless very interesting, and it should claim the attention and be carefully read by every one practising surgery. H. D. B.

MATERIA MEDICA, PHARMACY, PHARMACOLOGY, AND THERAPEUTICS. By W. HALE WHITE, M.D., F.R.C.P., Physician to and Lecturer on Pharmacology and Therapeutics at Guy's Hospital, London; Examiner in Materia Medica to the University of London, etc. Edited by REYNOLD W. WILCOX, M.A., M.D., LL.D., Professor of Medicine and Therapeutics at the New York Post-Graduate Medical School, and Attending Physician to the Post-Graduate Hospital, etc. Fourth American edition, thoroughly revised. Philadelphia: P. Blakiston's Son & Co., 1898.

WHEN an author of a book worthy of attention invites in so many words free criticism from the reviewer, it is quite probable that he will receive what he asks. A book so well written and so carefully edited as the above is bound to make one wish that the few unpleasant features of the work had been entirely eliminated. One of these, which we suppose is very difficult to avoid in an "edited" book, is the constant use of brackets, which greatly mar the appearance of the page, and sometimes even lead to confusion. Of course, it would not be just that Dr. White should be credited with Dr. Wilcox's views, nor that Dr. Wilcox should be held responsible for the ideas of the former; nevertheless, it is somewhat startling to see the subject-noun of a sentence shut within bars like a criminal. Again, one cannot help but be upset by reading a statement concerning the action of a drug and find in the very next sentence, enclosed in the ever-obtrusive brackets, a virtual contradiction of it. Another objection, perhaps more serious, to which we would call the author's attention, is the arrangement of drugs. The inorganic remedies are classified on the basis of their chemical relations, while those derived from vegetable sources are grouped according to their physiological actions, a rather illogical arrangement. In the main, however, the book is one whose value amply justifies its having run to the fourth edition. H. C. W., JR.

A MANUAL OF ORGANIC MATERIA MEDICA, BEING A GUIDE TO MATERIA MEDICA OF THE VEGETABLE AND ANIMAL KINGDOMS, FOR THE USE OF STUDENTS, DRUGGISTS, PHARMACISTS, AND PHYSICIANS. By JOHN M. MAISCH, Ph.M., Phar.D. Seventh edition, revised by HENRY C. C. MAISCH, Ph.G., Ph.D. Pp. 523, with 285 illustrations. Philadelphia and New York: Lea Brothers & Co., 1899.

MATERIA MEDICA AND THERAPEUTICS, AN INTRODUCTION TO THE RATIONAL TREATMENT OF DISEASE. By J. MITCHELL BRUCE. M.D. Pp. 609. Philadelphia and New York: Lea Brothers & Co., 1899.

THIS standard work of the late Dr. Maisch has been revised by his son, as the advance of pharmaceutical knowledge allows and the alterations in the British *Pharmacopœia* render necessary. Despite its title-page, the book is evidently intended even more for the pharmacist than the physician. It contains, however, a vast number of facts given in a concise form regarding those substances which furnish our drugs. The large number of excellent illustrations which accompany the verbal descriptions materially enhance the value of the book.

Dr. Bruce's book consists of essentially two parts—a consideration of the drugs official in the British *Pharmacopœia* and a study of the various organs of the body from a therapeutical stand-point.

The first part of the book is devoted to a description of the various medicinal substances, with brief notes of their physiological action and therapeutic uses. In the pharmaceutical portion we find concisely and intelligently arranged much valuable information about such points as the source, solubility, impurities, and incompatibilities of the drugs treated of—things that are oftentimes difficult or wellnigh impossible to find without searching several books.

The therapeutical portion of the book is not nearly so fortunately arranged. When an author undertakes, as in the present instance, to consider in the space of a couple of hundred pages all of physiology, pathology, and therapeutics he would seem to be almost courting disaster. It is no wonder, then, to find that the subject has in many instances been so condensed as to be contradictory and almost unintelligible. Thus, for instance, alcohol is said to stimulate the bloodvessels both centrally and peripherally, while lower down on the same page it is classed among the vaso-dilators. Also, we find several inaccuracies (some of which seem to be from lack of care in the revision of the present edition), such as the statement that the vaso-constrictor influence of ergot is a peripheral one, or that the action of opium on the pars vagum is principally a depressant one. Many disputed questions, such as the action of alcohol on the metabolism of the body and the mode by which iron increases the hæmoglobin the author seems to consider as settled beyond all cavil, wherein he differs from many who are accepted as authorities.

Of course, such errors render the book to a large extent unfit for students, while its brevity impairs its value as a therapeutic work of reference. The portion on materia medica, however, will frequently give a ready answer to those questions which so often arise regarding this subject. H. C. W., JR.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Rashes After Enemata.—MONRO calls attention again to the not infrequent association of cutaneous rashes with the administration of rectal enemata. Text-books on dermatology rarely make mention of the condition. The writer thinks that many rashes attributed to surgical operations or to an anæsthetic are in reality enema rashes. He believes that some cases of so-called surgical and puerperal scarlatina are instances of scarlet rash due to enemata. The possibility of the eruption being caused by the administration of drugs can, in the majority of instances, be eliminated.

The recorded cases are confined to the English language, and, with one exception, to British literature. The enema rash is much more common in females than in males. One case has been reported in a boy, aged eleven years; all the other published cases, twenty-six in number, were in females. Monro's six cases, which he reports, were also in females. Habitual constipation, whether primary or secondary to gastric disorders, seems to be a predisposing factor, and probably explains the preponderance of the rash in the female sex. The patients are generally adults, although the rash has been observed in childhood.

The interval that elapses between the giving of the injection and the appearance of the eruption is usually about twelve hours. It may be more than twenty-four or as short as two hours. The rash generally lasts two or three days; but the duration may be twenty-four hours or less, or it may be four days.

According to Monro, three principal types of the eruption may be distinguished—the scarlatiniform, the measley, and the small-whealed urticarial. Two or all of these may be present in one individual. The first variety is specially important, because of the liability of its being mistaken for true scarlet fever, and the third because of the severe itching with which it may be associated. Moorhouse has observed a rash maintain the urticarial type for twenty-four hours, then to become scarlatiniform for a few hours, and later to revert to the original type.

The distribution varies, and is not always symmetrical. The buttocks and thighs, and after these the face, may be considered the seats of predilection. The rash, however, may involve all parts of the body. There is usually no associated pyrexia. Occasionally a temperature of 101° to 102° has been observed. It may be associated with a severe burning sensation and intense itching. Coupland observed a case in which desquamation occurred after the rash had been out for three days. Desquamation is rare, however.

The urine remains free from albumin. Staveley states that indican can be detected in the urine, whereas it is rare in the early stages of scarlet fever.

Monro states that the rash occurs only after bulky injections, and never, so far as he is aware, after glycerin or nutrient enemata.

The explanation generally given for the occurrence of the rash is that it is due to fecal absorption. The large quantity of water dissolves some of the solid contents of the bowel, and as a result a considerable quantity of excrementitious matter is rapidly absorbed. This, being partly excreted by the skin, gives rise to the rash. Morgan, on the other hand, suggested in 1895 that the cutaneous lesion resulted from the use of a particular kind of soap in the enema. This view was supported by Gardner, who observed a considerable number of cases after the use of hard, yellow soap, whereas he has met with no rash in four hundred cases where soft soap was employed. He believed that the particular variety of soap was the main factor in the production of the rash. He found that the hard soap contained a trace of iron and was very slightly alkaline in reaction.

Monro raises some objections to the soap theory, but asserts that experience has shown that soft and not hard soap should be used for enemata. He gives detailed notes of six cases of enema rashes which came under his own observation.—*The Glasgow Medical Journal*, September, 1899, p. 165.

A Case of Acute Suppurative Cholecystitis, with Isolation of the Bacillus Typhosus, Eighteen Years After an Attack of Typhoid Fever.—HUNNER reports a case of acute suppurative cholecystitis due to the bacillus typhosus, which again illustrates the importance of this organism in the causation of gall-bladder infections and also the great length of time it may persist in the system after typhoid fever before setting up local inflammations.

A German woman, aged fifty-four years, was admitted to the Johns Hopkins Hospital on February 3, 1899. She gave a history of an attack of "remittent fever" eighteen years ago. She remained in bed only two weeks, and then insisted on getting up, although her illness continued for two months. There was typhoid fever in the neighborhood at the time. Three and one-half years before admission the patient was ill for a period of six weeks. The illness began with sudden onset of pain in the right side, shooting down into the right inguinal region. The attacks were intermittent in character, lasting half an hour or more and causing much nausea and abdominal tenderness. For two years she had slight pains and tenderness in the right side. Eighteen months before admission the attacks of pain increased in frequency and severity, and frequently after a paroxysm she could not bear the weight of her clothing. These attacks were apparently of gall-bladder origin.

Two years before entering the hospital she noticed a small, movable mass in the lower right quadrant of the abdomen.

The patient was operated on by Dr. Kelly after admission to the hospital. A large cyst was found springing from the region of the left ovary, and the right ovary was represented by a hard mass the size of a fist. Both ovaries and tubes and an adherent appendix were removed. Convalescence from operation was without interest until the fourteenth day, when she complained of nausea, and vomited several times. On the sixteenth day she had an attack similar to those complained of during the previous three and a half years. At the right costal margin a sensitive tumor, which was dull on percussion, could be palpated. The temperature was 101° F. On the following day the pulse was 140 per minute and the temperature was 103° F. A visible tumor, extremely tender, protruded in the right hypochondrium. The leucocytes were 29,000.

The condition was believed to be either a localized abscess following the removal of the appendix or an acute cholecystitis. Dr. Stokes operated and found a greatly distended and congested gall-bladder. There were fresh adhesions about the gall-bladder and a sero-fibrinous exudate in the peritoneal cavity. Cholecystotomy was performed and the gall-bladder permanently drained. No stone was found at the operation, but a calculus the size of a pea was discharged one week later.

In brief, the cultures from the gall-bladder gave a pure growth of a bacillus which corresponded in all its cultural characteristics with the bacillus typhosus. The bacillus, on certain media, presented many involution forms, with peculiar staining properties. The patient's own blood-serum agglutinated the organism in dilutions of 1 : 10 and 1 : 40. Her serum gave a positive Widal with a known typhoid organism in dilutions up to 1 : 100. The organism was pathogenic to rabbits.

Cushing, one year ago, collected four cases of typhoidal cholecystitis with gallstones, and reported two new cases. About the same time other cases were reported by Imhofer, Miller, and Mixter, so that, with Hunner's case, there are now ten authenticated cases of typhoid cholecystitis and cholelithiasis confirmed by bacteriological examination.

Cushing proposed the following theory regarding the gallstone formation in cases of typhoidal cholelithiasis: (1) The bacilli during the course of typhoidal infection quite constantly invade the gall-bladder; (2) the organisms retain their vitality in this habitat for a long period; (3) in the course of time the bacilli are almost invariably found clumped in the bile, suggesting the occurrence of an intravesical agglutinative reaction; (4) the clump presumably represents nuclei for the deposit of biliary salts, as micro-organisms may with regularity be demonstrated in the centre of recently formed stones; (5) gallstones being present in association with the latent, long-lived infective agents, an inflammatory reaction in the viscus of varying intensity may be provoked at any subsequent period.

Hunner reviews the various theories relating to cholecystitis and cholelithiasis. Of especial interest is the growing belief that gallstones are in most cases of infectious origin. Naunyn first formulated this theory, and was subsequently supported by Gilbert and Mignot, in France, and Richardson and Cushing, in this country.

Mignot, after careful experiments, states that the chief factors in the production of biliary lithiasis are: (1) The presence in the gall-bladder of an attenuated organism of any variety whatever; (2) a relative inertia of the biliary reservoir, causing partial stasis and preventing the premature expulsion of soft concretions of cholesterin.—*Johns Hopkins Hospital Bulletin*, August–September, 1899, p. 163.

Œsophagitis and Phlegmonous Periœsophagitis.—The patient was unable to swallow solid food, and even fluids caused severe pain in the upper portion of the œsophagus. By the use of the sound a stricture was detected in the upper portion of the œsophagus. It was impossible at first to pass the sound beyond the stricture. Later, by using considerable pressure, it was passed into the stomach, but at times caused great pain. Four days after entering the hospital the patient felt well and had no fever. The next night marked dyspnœa suddenly developed, and in a short time the patient was dead. In the jugulum and on both sides of the neck as high as the mastoid processes there was demonstrable emphysema of the skin. Post-mortem examination showed isolated calcified tuberculous foci in both apices. Over the last cervical vertebra there was a pus-cavity which extended into the posterior mediastinum in the region of the bifurcation. The lower portion of the œsophagus was normal. At the beginning of the œsophagus the posterior wall was thickened about 1 cm. Three cm. below the larynx there was an easily dilated stricture about 2 cm. long. The œsophageal mucous membrane was entirely normal. The submucous tissue and the musculature of the lower œsophagus were normal. One cm. below the lower border of the cricoid cartilage there was a spindle-shaped, purulent, strictly submucous infiltration, 7½ cm. in length. At the level of the thyroid cartilage there was a crescent-shaped, dirty green, gelatinous mass at the beginning of the œsophagus posteriorly. This communicated below with a suppurating cavity which extended into the posterior mediastinum. The cause of this condition is not usually clear. Often there is rupture of a peri-œsophageal abscess, a suppurating gland, cricoid perichondritis, vertebral abscess, or, especially, breaking down of cheesy lymph-glands in the outermost layers of the œsophagus. Circumscribed abscesses in the wall of the œsophagus without demonstrable local causes have been found, especially in consumptives. The author believes that the cutaneous emphysema was caused by the pressure of gas, during the severe dyspnœa, from the purulent foci into the surrounding tissues and under the skin. The fact that the sounding caused great pain and the temporary attacks of dull pain along the œsophagus, and the fact that the sound met with resistance at different distances (this being dependent on the variable filling of the abscess-cavity), could have helped in the diagnosis. The presence of a submucous abscess directly under the larynx and pushing the mucous membrane forward explains why a resistance was met 18 cm. from the teeth on the first sounding. It is remarkable that the œsophagus—which was surrounded for three-quarters of its circumference by a purulent mass—was not perforated by the numerous probings. The investigations of Zenker and v. Ziemssen throw some light on this fact. They removed an entirely healthy œsophagus from a man killed by accident, and by attaching a weight of 5 kg. increased its length from 17 cm. to 24 cm. When a weight above 5 kg. was attached the musculature near the mucous membrane was torn, but the mucous membrane remained entirely uninjured. A weight of 10 kg. tore the mucous membrane.—HUISMANS, *Deutsche med. Wochenschrift*, 1899, No. 17.

SURGERY.

UNDER THE CHARGE OF

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Lesions of the Lateral Sinus.—GANGOLPHE and PIERY (*Revue de Chirurgie*, September 10, 1899), from personal observations and the study of cases collected from the literature, arrive at the following conclusions:

1. Lesions of the lateral sinus may be produced in cases of traumatic injury of the cranium by a double mechanism; by being torn by spicules of bone or foreign bodies, and by rupture, where the fragments separate in cases of fracture.

2. These lesions of the lateral sinus give rise to the formation of clots, which collect between the dura mater and the skull. Their position and extent is determined on the one hand by the adhesion of the dura mater, and on the other by the extent to which it has been torn away by the traumatism. Frequently there coexists with this hemorrhage one into the arachnoid, a semifluid clot, the color of gooseberry jelly, covering that hemisphere of the brain.

3. The symptomatology of the lesions of the lateral sinus is most variable; it is far from realizing always the complete symptomatology of cerebral compression, and frequently produces, feature for feature, the picture of apoplexy from cerebral hemorrhage.

4. Not only is the diagnosis of a torn sinus almost always impossible, but frequently it does not permit one to affirm the presence of an intracranial hemorrhage from traumatism of a bloodvessel.

5. In such a case, where the diagnosis is difficult, although the only elements are an apoplectiform attack and a previous traumatism, it is necessary to act as if one were assured of the presence of an intracranial hemorrhage of traumatic origin.

6. The line of action to be pursued is the following:

a. Where the sinus is exposed the wound is tamponed through the opening in the skull after any fragments have been removed.

b. If the traumatism has not exposed the sinus, trephining should be immediately done. The trephine should be placed at the point where the traumatism took place, and not in the region indicated by cerebral localization from any symptoms. These localization symptoms have in certain cases led the authors into mistakes that have required a second trephining before the actual seat of the lesion could be attacked. When the tear has been located it is closed by a tampon of iodoform gauze.

Rhinoplasty over a Metallic Frame.—Martin (*Revue de Chirurgie*, August, 1899) says that operations on this principle are only applicable to a certain number of cases, where the bony structures as well as the flesh have been destroyed. Where these conditions exist the operation is very successful if the patient's condition is proper. This has been proved by a case in which there has been no accident or irritation since healing took place during a period of over four years. The patient's respiration has become nasal, while all irritation, which was very marked previously, has disappeared.

The conditions which the author believes to be essential to the success of the operation are:

1. Cure of the pathological process or its local manifestation, as syphilis.
2. The possibility of securing a healthy flap of sufficient size, so that immediate swelling or later retraction will not cause pressure necrosis.
3. The possibility of establishing a sufficiently solid internal layer.
4. The existence of sufficiently healthy bone upon which to fix the metallic support.

Under these conditions a good result is assured, while the method should not be blamed for poor success.

The Partial Subcutaneous Rupture of a Flexor Tendon of the Forearm, with the Formation of a Degeneration Cyst.—Thorn (*Archiv f. klin. Chirurgie*, 1899, Band lviii., Heft 1–4) reports a case of rupture of one of the flexor tendons in the forearm, with the subsequent formation of a degeneration cyst which had all the appearances of a ganglion.

His study of this case and the available literature on the subject lead him to the following conclusions:

1. Traumatic rupture of the flexor tendons of the forearm may occur subcutaneously. In the case reported the rupture was partial; only the peripheral zone of the transverse section of the tendon was ruptured.
2. The rupture can produce degenerative and reparative changes which cannot be distinguished until after the tendon sheath has been opened. If the extravasated blood has any influence upon these processes it could not be told in the case studied, as it was examined at too late a date.
3. The reparative changes are capable of producing a complete healing.
4. The degenerative processes in the tendon stump and the surrounding cellular tissue can lead to the formation of a cyst which simulates in character a ganglion.

Interscapulo-thoracic Amputation.—Le Conte (*Annals of Surgery*, September, 1899) reports a successful operation which he performed, as follows:

The incision began over the sternal end of the clavicle, and was carried to its middle, and then curved downward to the axillary fold. The skin and superficial fascia are dissected up, exposing the inner two-thirds of the clavicle. The clavicle is then freed from its sternal and muscular attachments, and the clavicular portion of the pectoralis major is separated from the costal portion of the muscle up to the axillary fold. The clavicle is pulled upward and outward, and if the subclavian muscle does not readily strip off its attachment to the first rib is divided. The pectoralis minor is divided and the coracoid portion reflected upward with the clavicle. This exposes the axilla fully. The vessels are seen traversing the axilla from the anterior scalenus muscle; their sheath is opened and the vein dissected away from the underlying artery. Two ligatures are passed around the artery and tied. The arm is then held up, to empty it of blood, while two ligatures are passed around the vein, but these are not tied until the arm is blanched. The vessels and brachial plexus of nerves are severed, and the costal portion of the pectoralis major.

A posterior incision is now carried from some point on the anterior incision (as near the tumor as is expedient) directly backward and downward to the inferior angle of the scapula and up to the posterior axillary fold. The skin and superficial fascia are dissected up, the trapezius severed, and the transversalis colli or posterior scapulary artery secured and the muscles attached to the scapula divided; then the serratus magnus and latissimus dorsi are cut, and later the posterior axillary fold. If there is sufficient skin for flaps the skin of the axilla is cut across, otherwise a flap can be taken from the internal aspect of the arm.

This method has the following advantages: It gives the widest and fullest exposure of the vessels and decreases the accidents of ligation to a minimum. The disarticulation of the clavicle is simpler, quicker, and easier than a resection of the bone, and the danger of wounding the vessels is less, because these vessels are well protected by the sterno-hyoid and sterno-thyroid muscles. The elevation of the arm, after securing the artery and before the vein is tied, makes a practically bloodless amputation. The suprascapular and posterior scapular arteries are easily picked up before being cut. In malignant growths, where the outer end of the clavicle is involved, there is less risk of return if the entire bone, with its periosteum, is removed. It removes everything in one piece, a better surgical procedure when dealing with malignant growths.

The Removal of the Lymphatic Glands in the Inguinal Region and the Iliac and Obturator Vessels in One Operation.—LENNANDER (*Centralblatt für Chirurgie*, 1899, No. 37) has described an operation which he believes is essential to any radical intervention in cases of malignant disease which tends to involve these lymphatic regions. He believes it to be indicated in case of carcinoma or sarcoma of the lymphatics in the inguinal region, on the condition that the primary tumor can be radically dealt with and where no other inoperable lymphatic involvement is present.

In the second place, it is valuable in cases of severe tubercular lymphadenitis in this region and the iliac fossa, where there is no contraindication to a severe operation.

In the latter instance the extent of the operation differs in that only diseased lymph-glands and surrounding tissue are removed. Sound tissues and fat are allowed to remain, in order that later, by the development of the lesser lymphatics, a collateral lymph circulation can be established. The same is true in cases of operation for suppurative lymphadenitis.

The operation which the author has developed and employed commences with an incision from the symphysis pubis along Poupart's ligament to the anterior superior iliac spine, and then along the crest of the ilium for one-third or one-half its length. An incision from this over the femoral vessels gives access to the lymphatics of that region. This incision is carried through the muscles and fascia, and by retroperitoneal dissection gives access to the glands in the iliac fossa along the iliac arteries and into the true pelvis. Poupart's ligament is severed from its attachment to the pubic bone.

Drainage is provided from the iliac vessels through the posterior portion of the wound. Poupart's ligament is carefully sutured in its original position and the muscles and fascia united except where left open for drainage.

This operation does not in the least endanger the integrity of the abdominal wall, as it is entirely freed, and its bony and fascial attachments are afterward reconstructed. No motor nerves are in any way injured.

The author has employed the operation successfully in two cases. In cases of suppurating adenitis this incision cannot be carried to its full extent, since primary union of the attachment of Poupart's ligament cannot be depended on.

PEDIATRICS.

UNDER THE CHARGE OF

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The Association of Scarlatina with Diphtheria.—CHABADE (*Arch. russes de pathol.*, 1899, p. 208) examined bacteriologically the throats of 214 cases of scarlatina observed in the Hospital Petropavlovsk, St. Petersburg, from December, 1897, to September, 1898. Of these, 98 had a catarrhal angina, characterized by a simple redness of the mucous membrane, without false membrane; 33 had a lacunar angina, the false membrane covering only the crypts of the tonsils; and 83 showed a true pseudomembranous angina, with more or less extensive false membrane upon the tonsils and sometimes even upon the pillars of the fauces, uvula, soft palate, and posterior wall of the pharynx.

In the first group of cases cultures revealed the presence only of streptococci, sometimes associated with staphylococci, but never with bacilli of diphtheria.

In the second group the Klebs-Loeffler germ was found in only two cases, once in almost a pure culture.

In the third group the diphtheria bacillus was found in eleven instances, three times in nearly pure culture and eight times with streptococci.

The question is raised in view of the occasional presence of the Klebs-Loeffler bacillus in the throats of persons in good health, whether, in the cases in which this germ was found by Chabade, it did not exist purely accidentally, without participating in the evolution of the morbid process. This view, however, seems untenable when it is considered that several times the bacilli were found in almost pure culture, and even when associated with streptococci were always very numerous. A second argument in favor of the virulence of the bacillus in these cases lies in the fact that in the cases in which it was found the mortality was higher than in the cases in which the streptococcus alone existed: in 103 cases of the latter the mortality was 38 per cent., while of the 13 cases of angina with the diphtheria bacillus, 8, or 62 per cent., terminated in death. Another fact attesting the virulence of the bacillus was the occurrence of a fatal croup in a child, aged one year, who, with a typical scarlatina, showed a true diphtheritic pseudo-membranous angina. Finally, the author studied twenty-four cases of so-called late or secondary angina, which appeared in from twelve to forty-one days after the beginning of the scarlatina, six cases being lacunar and eighteen pseudo-membranous. The presence of the Klebs-Loeffler bacillus was proven in two cases of the first category (once in pure culture) and sixteen of the second (eleven times to the exclusion of all other microbes). He therefore holds that the secondary anginas of scarlet fever are most frequently diphtheritic in nature.

Chabade concludes that patients showing a mixed infection should be isolated from cases of pure scarlatina, and to this end he recommends the bacteriological examination of all patients showing false membrane. In accord with the practice of many others, he advises that such mixed infections be treated with the anti-diphtheritic serum.

Intravenous Injection of Antidiphtheritic Serum in Grave Cases.—GAGNONI (*Annales de Médecine et Chirurgie Infantiles*, August 15, 1899) reports three cases of grave diphtheritic angina complicated with croup, with symptoms of imminent suffocation, in young children, which, with the advice of Professor Sclavo, of Siena, he treated by intravenous injections of anti-diphtheritic serum. The results were most satisfactory, the temperature falling to normal, stenotic symptoms disappearing with the expulsion of false membrane.

Transmission of the Agglutinating Substance of the Eberth Bacillus through the Milk.—COURMONT and CADE (*Lyon Médical*, September 3, 1899, p. 5) report the case of a mother who had nursed her two-months' old baby for two weeks after she was taken ill of typhoid fever. Three days after the child was taken from the breast it was found that its blood possessed the agglutinating power in a dilution of 1 : 10, while the mother's milk showed a positive reaction at 1 : 30 and her blood at 1 : 200. Eight days after weaning the infant's blood failed to produce the reaction. The case, therefore, serves to confirm the observations of Landouzy and Griffon and of Castaigne, and to demonstrate the possibility of transmitting to a nursling certain properties acquired by the blood-serum of the nurse, and the passage of these substances through the mucous membranes of the infant. The occurrence of the changes in the fluids of the nursling appears to depend upon two factors—the intensity of the changes in the nurse's blood-serum and the duration of the transmission by ingestion of her milk. This influence is but temporary, and ceases within several days after nursing is suspended.

Perichondritis of the Larynx in a Case of Scarlatina.—Kraus (*Prager medicinische Wochenschrift*, 1899, Nos. 29 and 30) reports an instance of this rare complication of scarlatina, which has been observed by Rauchfuss only four times in 903 cases, and by Leichtenstern but twice in 467 cases.

The patient was a child, aged eight years, who was admitted to the hospital, in a comatose condition, on the third day of scarlatina, complicated by a non-diphtheritic pseudomembranous angina. At the end of six days the fever subsided and convalescence seemed established, when there developed aphonia, then dyspnœa, with obstruction. Laryngoscopic examination revealed perichondritis of the larynx, for which intubation, and finally tracheotomy, was demanded. During the succeeding night the canula was removed because of an access of suffocation, and a little pus came from the wound.

For twelve days the child did well, but at the end of this time appeared a hemorrhagic nephritis, then a purulent pleurisy, and the child finally died a month after its entrance into the hospital.

At the autopsy the mucosa of the larynx was found congested and swollen, principally on the posterior wall. The internal face of the cricoid was occupied by an abscess the size of a nut, which had opened through the mucous membrane. The cartilage itself was denuded of its perichondrium and partly necrosed. The mucosa of the trachea and bronchi showed purulent catarrh.

Scarlatina in Young Infants.—Josias (*La Médecine Moderne*, 1899, p. 251) reports two cases of scarlatiniform erythema, with angina and more or less intense fever in infancy, which he considered as true scarlatina, in opposition to the opinion of several of his colleagues, who considered the cases as simple erythema of intestinal origin.

The first case occurred in the person of a female infant, aged one and one-half months, who presented a scarlatiniform eruption, a red throat, and fever lasting several days, with slight albuminuria, pseudo-rheumatism, and psoitis, but without the slightest disturbance of the stomach or intestines. This child had had, a few days before its eruption, a slight wound of the conjunctiva, and it was suggested that there had been an infection through the conjunctiva of streptococcic or gonococcic origin. The child recovered, and no other case of scarlatina occurred.

The second case was undoubtedly scarlatinal in character. This child was one year of age. She presented a generalized scarlatiniform erythema and intense redness of the pharynx, and was greatly prostrated. There was neither diarrhœa nor convulsions. The skin was slightly moist, the temperature 104°. Since the child had been overfed, and, consequently, its erythema attributed to intestinal causes, it was intrusted to a wet-nurse.

At the end of five days the exanthem had disappeared and the child seemed well, but desquamation occurred without further accident. No case of scarlatina existed in the neighborhood; but, notwithstanding, the author maintained his original diagnosis, which was confirmed by the fact that the wet-nurse contracted the disease while the child was desquamating.

These two cases, especially the second, go to prove that infants may contract scarlatina without any immediate known source of contagion, and that it is well to suspect the disease in any infant exhibiting a scarlatiniform erythema, with sore-throat and fever, in the absence of symptoms depending upon the gastro-intestinal tract.

THERAPEUTICS.

UNDER THE CHARGE OF

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Chloretone.—DRS. E. M. HOUGHTON and T. B. ALDRICH report upon this remedy, which is formed when caustic potash is slowly added to equal weights of chloroform and acetone, and this may be isolated from the mixture, after the removal of any excess of acetone and chloroform, by distilling with steam. It occurs as a white, crystalline compound, having a camphoraceous odor. It is very soluble in chloroform, acetone, strong alcohol, ether, benzine, and glacial acetic acid; sparingly (to 1 per cent.) in cold water, more soluble in boiling water. If the crystals or tablets containing the substance or solutions of it are administered to animals, or air saturated with its vapors is inhaled by them, all degrees of hypnosis to complete anæsthesia may be produced, of a duration depending upon the amount of the substance absorbed. If the amount administered is not excessive the animal makes an excellent recovery. After an extremely large amount the animal remains insensible for several days, the respiration becoming progressively slower and weaker until death supervenes. Administered by the stomach, this substance passes quickly as such into the circulation, and is distributed through the body. It produces no spectroscopic changes in the blood. The pulse-rate is slightly lessened, but the action of the heart remains excellent until the organism begins to suffer from a lack of oxygen. Kymographic tracings taken from the carotid artery of dogs show that the blood-pressure usually remains unaffected. The main action of the drug is confined to the central nervous system, it being essentially the same as that of the other anæsthetics and hypnotics of the fatty acid series, differing from most of the members of this group in that it does not depress the circulatory system. Beside its central action it possesses local anæsthetic properties in a marked degree, resembling cocaine in many respects. Blood-serum and other organic fluids are preserved for an indefinite time if saturated (a little more than one-half of 1 per cent.) with this substance. Culture experiments with various kinds of bacteria prove that it possesses considerable antiseptic power. Since chloretone is volatile at ordinary temperatures and circulates in the blood, one would expect it to be eliminated by the lungs; but thus far it has not been found in the expired air, nor has its presence been positively demonstrated in the urine. It is, then, probably decomposed in the body. In practice it has been found to lessen the pain of lacerated wounds when freely applied in aqueous solution. Pain and uncontrollable vomiting of gastric origin may be quickly relieved by its internal administration. Gastric cancer, sea-sickness, and the vomiting of pregnancy would seem to be promising opportunities for its use. Laboratory experiments show that it renders the mucous membrane of the alimentary canal insensible to irritants. As a hypnotic it should be chosen in the persistent insomnia of the aged, and cardiac diseases, with renal complications, accompanied by high arterial tension. The dose varies from six to twenty grains in tablet form, as a single dose, followed by a draught of milk or water; as high as sixty grains have been given at one time without producing untoward effects. Possibly the drug might prove useful as a general anæsthetic if administered in large doses; or it may be given before chloroform or ether, and allow complete anæsthesia to be produced by the use of a minimum of the usual anæsthetic. Perhaps such administration may prevent the accompanying vomiting.—*Journal of the American Medical Association*, 1899, vol xxxiii., p. 777.

[A limited use of this remedy seems to bear out the statements of the authors, based mainly on careful laboratory experimentation.—R. W. W.]

The Therapeutic Value of Heroin.—DR. SIGISMUND WIERZBICKI finds this an excellent remedy for cough and for diminishing the serum of the expectoration; muco-pus is unchanged in amount. An unpleasant symptom is irritation and dryness of the throat. It has no effect upon temperature, the circulatory or alimentary systems, nor, indeed, upon the night-sweats of tuberculous patients. The comfortable sensations of patients, particularly asthmatics, taking this remedy may be ascribed to the diminished attacks of coughing. It has no analgesic effect on the central nervous system, although sleep may be better after its use. It may be administered hypodermatically in aqueous solutions to which sufficient acetic acid has been added.—*Klinische-therapeutische Wochenschrift*, 1899, No. 27, S. 862.

The Open-air Sanitarium Treatment of Phthisis in the British Islands.—DR. R. W. PHILIP presents a strong plea for the truth of the proposition that "if the patient can only be persuaded to be out-of-doors—lying, sitting, or walking, as the case may be—a large part of each day, and when in-doors to allow the freest access of fresh air day and night, results may be obtained in almost any district which will compare satisfactorily with those obtainable at more favored resorts." As to the safety of this method, he presents his tables, showing that not only is this possible during February, March, and April, but that no unpleasant results follow its practice.

As to what has been accomplished, the matter is summarized as follows: (1) Color and appearance—the look of delicacy is quickly replaced by an aspect of robustness, such as one is accustomed to recognize as developing on shipboard. (2) Appetite and digestion—there is no longer complaint of nausea, sickness, sense of oppression, or pain. Appetite returns in an astounding fashion, and even a craving for food, not easily satisfied. Milk and fats of various kinds, which previously produced loathing, are taken freely and even greedily. Constipation likewise tends to disappear. (3) Weight—the rapidity with which flesh is put on is phenomenal. Gains of from two to six pounds in a week's time are frequently recorded. The leading cause for this is to be found in the largely increased power of assimilation, which is rendered possible by the improvement in appetite and primary digestion. (4) Cough—this may be interpreted as, in large part, the groan of the lungs for more air. Given an unlimited supply, and it is seldom heard. It may be at times a bad habit. Apart from occasional cough for the purpose of expectoration, the sound need not be heard. The cough which occurs so frequently when the disease is treated in snug, confined bed-rooms is in large part the expression of irritation by reason of exhausted or fouled air. (5) Expectoration—sputum lessens speedily in amount. It becomes more and more mucous, until finally it may disappear. Hæmoptysis is almost unknown. (6) Night-sweats—this is an avoidable occurrence—an expression of culpability on the part of physician or nurse. Under the open-air treatment it is as infrequent as it was previously supposed to be common. No special drugs are used. (7) Circulation—the pulse-rate soon lessens, each beat becomes more forcible, and the blood-pressure is raised. Coincidently, coldness of the extremities, which may have been most distressing, disappears, and similarly the tendency to shiver and feel "creepy," which is frequent in consumptive patients under the protective system of treatment. (8) Temperature—pyrexial elevations are seldom recorded in patients who have been more than ten days or a fortnight in residence, save in the presence of intestinal or other such complication, or of acute dissemination of tubercles throughout the lungs, or more widely.—*The Practitioner*, 1899, vol. lxiii. p. 11.

DR. T. EDWARD SQUIRE pleads for thorough "fresh-air" treatment. It is not enough to let a patient spend a certain portion of the day in the fresh air if he breathes impure air for the remainder of the twenty-four hours. He should be absolutely forbidden to enter a close room, even such as the public rooms at a hotel or a place of public entertainment. There is a prejudice against night air which must be overcome. The air is probably purer during the night than in the day, though, in some situations especially, it may contain more moisture, and it is always cooler than during the time when the sun is above the horizon. For this reason the patient requires to be warmly covered if in the open air at night. Indeed, it is important to keep the patient warm. So long as the mouth and nose are uncovered there is no necessity to expose any part of the body. The respiratory movements must not be restricted, and, partly for this reason, women are not allowed to wear stays. Another reason for omitting these is that the work of holding up the body is thrown entirely upon the muscles, and, these being strengthened, a better carriage of the body is obtained. For similar reasons, in early disease, some carefully regulated gymnastic exercise in the open air may be recommended.—*Treatment*, 1899, vol. iii. p. 465.

Belladonna in the Bronchopneumonias of Children.—Dr. D. A. Hodghead recommends this for the following reasons: (1) In small doses it is mildly narcotic, producing a slightly sedative influence on the nervous system. (2) It is, in small doses, a heart tonic, raising the arterial tension and increasing the circulation by stimulating the cardiac sympathetic, and in a corresponding manner depressing the pneumogastric, the inhibitory nerve. (3) It is a respiratory stimulant. (4) It produces a dilatation of the superficial capillaries, and in a corresponding manner relieves the congested lungs. It produces an increased secretion of urine and bile. (5) The most important action in this relation is that it diminishes secretion in the bronchial tubes and pulmonary tissues. To be effective it should be given every hour or two, in quite large doses, until the desired results are obtained. Children are not very susceptible to the drug, and infants a few months old will prove no more sensitive to the same dose than children of five and six years. It is more useful when the disease is well developed and the bronchial secretions are superabundant.—*Pediatrics*, 1899, vol. viii. p. 214.

Results of the Antitoxin Treatment of Diphtheria in Prussia.—Dr. Edward F. Willoughby reports that from 1885 to 1894 the death-rate from this disease averaged 15.5 per ten thousand of population, but it fell in 1895 to 9.0, in 1896 to 7.6, and in 1897 to 6.2. This startling phenomenon admits of but one explanation—viz., that while the treatment of this disease by antitoxin had previously been only partially adopted even in hospitals, its value was then so generally recognized that the government made arrangements for providing an unlimited supply of the serum, and its use has ever since been extending, not only in hospitals and in private practice, but scarcely less so in that of the poor-law medical men. Pointing out that improved sanitation has aided in lowering the death-rate, the total diminution cannot be ascribed to this alone. In answering the objection that the fall has not been uniformly marked when districts are considered individually, he shows that this method, the success of which depends on its being begun at the earliest possible day after the commencement of the disease, has a far better chance among intelligent, thrifty, industrious, and, on the whole, clean and well-to-do people; and its failure to so markedly lower the death-rate among people possessing the characteristics opposite to these may be ascribed to the delay of a poor, ignorant people in seeking medical advice and the prejudice with which such persons everywhere regard "vaccinations."—*The Therapist*, 1899, vol. ix. p. 174.

Ichthalbin for Diseases of Children.—Dr. Th. Homburger recommends this as a substitute for ichthyol, which, although efficacious therapeutically, is objectionable because of its taste and odor. For children under six months the dose varies from one to one and one-half grains; at six months, two and one-half to three grains; reaching the maximum of five grains at the second year, thrice daily. At five, seven grains, and at ten years fifteen grains suffice. If mixed with an equal part of chocolate it is easily taken. Long-continued observation demonstrates that the remedy is harmless and can be taken internally without repugnance. Moist eczemas are dried within a few days, and that when external remedies alone were unsuccessful. In conjunction with customary external remedies the healing of dry eczema is hastened; so also is the furunculosis of weak children. In chronic pneumonia, scrofulosis, and chronic intestinal catarrh the appetite is improved and the body-weight increased; on the other hand, in acute catarrh the results are not so striking.—*Therapeutische Monatshefte*, 1899, Heft 7, S. 361.

GYNECOLOGY.

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Metrorrhagia of Ovarian Origin.—BOUILLY (*La Gynécologie*, June 15, 1899) calls attention to the peculiar features of uterine hemorrhage due to cystic degeneration of the ovaries without accompanying salpingitis. It appears first as an ordinary menorrhagia, but in time the flow becomes intermenstrual, and often continues throughout the month, until the resulting anæmia is extreme. The ordinary methods of treatment—hæmostatics, hot injections, intra-uterine applications, and tampons—have little or no effect. Curettement, though often repeated, does not check the flow, since it is not due to the ordinary hyperplastic endometritis. Since pain is frequently absent, the relation of the metrorrhagia to the ovaries may be entirely overlooked unless a careful examination is made, with the view of discovering moderate enlargement of these organs.

Gynecological Operations in the Insane.—PICQUÉ and FEBRE (*La Gynécologie*, June 15, 1899) report a series of successful cases in which operations were followed by either a cure or marked improvement in the mental condition. In no instance was a healthy organ removed, the indications for interference being the same as in sane patients. Great care was exercised in selecting cases to exclude those in which, from the hysterical tendency of the subjects, there was reason to apprehend post-operative psychoses. The writers insist that judgment must be used in the selection of proper cases, since some patients will only be rendered worse by the operation.

Ligation of the Uterine Arteries in Cancer of the Uterus.—LOEWY (*La Gynécologie*, June 15, 1899), in a communication addressed to the Paris Anatomical Society, criticises the operation from an anatomical stand-point, showing that it does not retard the progress of the disease. When the disease is in the operable stage hysterectomy is always preferable, and, if that is impossible, curettement and cauterization offer a better prospect of arresting the hemorrhage than ligation of the uterine arteries.

Interstitial Suppuration in the Cancerous Uterus.—KEIFFER (*La Gynécologie*, June 15, 1899) reported to the Belgian Society of Pathological Anatomy the results of experiments in which he injected fluid into the tissues of cancerous uteri. Without pressure the fluid at once oozed from the ulcerating surface. Sections through the organs showed that the muscular tissue which appeared to be healthy was generally infiltrated with leucocytes, while the vessels were destroyed. The reason why patients with this condition do not suffer from profuse and fatal hemorrhages is doubtless due to the frequent spasmodic contractions of the muscular tissue.

Ovarian Extract in Epilepsy.—TOULOUSE and MARCHAND (*La Gynécologie*, June 15, 1899) report five cases of epilepsy which seemed to be directly dependent upon amenorrhœa or the climacteric, one being post-operative. No ill effects followed the use of the remedy, while the diminution in the number and severity of the epileptic attacks was marked. Two young women who had long suffered from amenorrhœa menstruated within five weeks after the treatment was begun. The report is in general favorable.

Stypticin in the Treatment of Uterine Hemorrhage.—NEDERODOFF (*Bibliotheca Wratcha; La Gynécologie*, June 15, 1899) reports twenty-six cases in which the drug was used in the treatment of hemorrhage due to various causes. He began with less than a grain, increasing the dose to six grains. If administered hypodermatically, from one and one-half to two grains were used daily. No bad effects were noted in any instance. The writer concludes that stypticin has a distinct hæmostatic action, especially in metrorrhagia, which is not due to the inciting of uterine contraction. It seems to act rather upon the central nervous system (vasomotor). Stypticin is a pure hæmostatic, and has no effect on the morbid condition which causes the hemorrhage.

LAVIALLE and RUYSSEN (*Der Frauenarzt*, June 16, 1899) think that stypticin is closely allied to hydrastinin in its physiological action upon the central nervous system. Its hæmostatic effect is doubtless due to lowering of the arterial pressure, so that the formation of thrombi is favored. Excessive doses in animals cause complete muscular relaxation and slowing of the respiration, followed by overstimulation and death from tetanus.

Primary Cancer of the Vulva.—SAND ("Inaugural Dissertation," *Centralblatt für Gynäkologie*, 1899, No. 27), from a study of cancer of the vestibule, arrives at the conclusion that trauma is the starting-point of the disease. He believes that masturbation is one of the most frequent causes.

FRANCKE (*Virchow's Archiv*, Band cliv.) analyzed twenty cases of malignant disease of the external genitals, four being primary.

KOPPERT (*Centralblatt für Gynäkologie*, 1899, No. 27) reports twenty-five cases of primary cancer of the vulva from the Jena clinic. He finds that the disease begins most frequently in the labia majora and vestibule, epithelioma being the prevailing type. The condition of the inguinal glands is of vital importance. Those about the seat of the growth should be removed at the time of operation if they are enlarged. Pruritus is the most common symptom in the incipient stage.

The prognosis is very unfavorable. Thorough excision of the growth and affected lymph-glands offer the only means of relief.

OBSTETRICS.

UNDER THE CHARGE OF

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A Case of Repeated Cæsarean Section, with Transverse Incision.—In the *Centralblatt für Gynäkologie*, 1899, No. 27, LUDWIG reports the case of a patient upon whom Cæsarean section by transverse incision had been practised because of a rhachitic pelvis. The result of the first operation was successful, the patient making a good and rapid recovery. She soon afterward became pregnant, and the same operation was repeated at full term.

Upon opening the abdomen slight adhesions were found between the parietal peritoneum and the mesentery, and a very slight adhesion between a small bit of mesentery and the fundus of the uterus. The womb was opened in the old scar, and the child and placenta were easily extracted. There was very little bleeding; the uterus contracted well, and the patient made a rapid recovery.

This case gave opportunity to examine the conditions existing after this form of Cæsarean section. It was interesting to observe that there were no adhesions between the anterior surface of the uterus and the abdominal wall, and the womb could be opened in the scar of the first operation without difficulty.

Wounds of the Fœtal Eyes Occurring During Labor.—In the *Centralblatt für Gynäkologie*, 1899, No. 27, CRAMER contributes a paper upon this subject.

He reports the case of a multipara who had a contracted pelvis complicating disease of the hip-joint. Labor was induced, the forehead presented, and the forceps was applied as well as possible to the sides of the head, the edges of the blades bearing upon the outer edges of the orbits. The child was delivered with considerable difficulty.

Soon after its birth bleeding occurred from the left eye. Upon examination a depressed fracture of the left side of the forehead was found, and crepitation was discovered about the middle of the left orbital arch. Upon opening the eyelids the cornea soon collapsed, and the fracture of the outer table of the skull had apparently torn the sclera. Under antiseptic precautions these wounds healed without infection. The eye, however, was lost through absorption of its liquids and collapse of the chambers of the eye.

The writer quotes the principal papers extant upon the subject, which show the accident to be a rare one. It is ascribed in this case to the contracted pelvis, the unfavorable presentation, and the necessity for applying the forceps in the manner described.

[The editor recently had under observation in the Jefferson Maternity a case of hemorrhage from the conjunctiva, which at first sight was suggestive of possible traumatism. On examination, however, this was found to be impossible, and the reason for the hemorrhage was evidently in the condition of the child's blood. The case was referred to an ophthalmologist, and the child ultimately recovered with the preservation of the eye. A similar accident to the one reported by the writer is sometimes seen after version in highly contracted pelves. It is, however, rare in these cases, and should very seldom happen under the use of the forceps.]

A Study of Fœtal Development by Means of the Röntgen Rays.—In the *Centralblatt für Gynäkologie*, 1899, No. 34, BADE gives the results of the examination of ten specimens to determine the length and development of the fœtus at different periods of gestation. The Röntgen rays were used to determine the presence or absence of bone. The period of development of these specimens varied from eight to ten weeks.

The first specimen was but 3 cm. long, and weighed 2 grammes. There was no trace of bony tissue on using the Röntgen rays. The second specimen was 3.4 cm. long, and here faint shadows were obtained of the cranium, the upper and lower jaw, the clavicle, the upper extremities of the humerus, radius, and ulna, the lower extremities of the thighs, and some of the first ribs. In the third and fourth specimens the same portions of the skeleton were found as in the second. This was a case of twin embryos, and in addition traces of the vertebræ could be observed. The fifth was 7.1 cm., and showed less signs of ossification than in the preceding. The sixth was 9 cm. long, and the formation of bone was far advanced, especially in the fingers and skull. Faint traces of the bones of the ears could be seen. The seventh, eighth, and ninth, whose lengths were greater by 1 cm., showed formation of bone in the pelvic bones, and a better development of the shafts of the long bones. The tenth specimen was 14.5 cm. long, and gave shadows of all the skeleton except the third, fourth, and fifth tarsal phalanges, and was also remarkable for the narrowness of the bodies of the vertebræ.

Rupture of the Uterus and Hysterectomy.—At a recent meeting of the Obstetrical Society of Vienna, LUDWIG showed a patient who had recovered from rupture of the uterus, treated by hysterectomy (*Centralblatt für Gynäkologie*, 1899, No. 34). The patient was a multipara, and was in labor, with breech presentation. The physician in charge attempted to extract the child by pulling upon the feet, when the head became separated from the trunk. On admission to the clinic an extensive rent was found in the lower part of the uterus. Abdominal section and hysterectomy were at once performed, the patient making a good recovery.

In the discussion Schauta stated that he had performed a number of these operations, with unsatisfactory results. He ascribed death in these cases to septic infection, and stated that if this were present the patient would surely die, whether operated upon or not. A second danger was hemorrhage, which could usually be controlled.

Chrobak ascribed death in these cases to anæmia following hemorrhage, and not to septic infection. Braun had not seen good results following abdominal section, and had ascribed death in such patients to anæmia and sepsis together. Rapid heart-failure was usually seen. Ludwig regarded the recovery of the patient as remarkable and most satisfactory, in view of the fact that she was carried a long distance to the hospital and that the intestines were found in the uterus and had undergone considerable compression through uterine contraction.

DERMATOLOGY.

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The Nosological Value of Eosinophilia and the Elimination of Eosinophilous Cells by the Skin.—LEREDDE (*Annales de Dermatologie et de Syphiligraphie*, 1899, No. 4), at a recent séance of the Société Française de Dermatologie et de Syphiligraphie, expressed the opinion that the existence of eosinophilia associated with the excretion of eosinophilous cells by the skin—the union of the two being necessary—was proof that pemphigus foliaceus and pemphigus vegetans are forms of one and the same blood disease, the type of which is the dermatosis of Duhring. These affections are only skin diseases secondarily; they are essentially forms of a blood disease due to the reaction of the hæmatopoietic organs, especially of the bone-marrow. This reaction may be produced under the influence of multiple intoxications of heterogenous or endogenous origin, transient or lasting.

The Cutaneous Para-tuberculosis.—J. C. JOHNSTON (*Journal of Cutaneous and Genito-Urinary Diseases*, July, 1899) concludes from his studies that there exists a class of cutaneous diseases analogous to the para-syphilodermata, which may be designated para-tuberculoses. They are not in themselves tuberculous, but they develop and flourish on a tuberculous soil. They may be divided into three groups: scrofuloderms, tuberculoderms, and dyschromias. The scrofuloderms are pure pyodermias, by which characteristic they are separated from the tuberculoderms, which are only accidentally pustular. The tuberculoderms include a variety of affections, ranging from erysipelas perstans to lichen scrofulosorum, which are toxæmias. The points upon which the right of a disease to admission to this category rests are as follows: absence of tubercle bacilli, occurrence in scrofulous patients, a pathological anatomy comparable to that recognized for tuberculosis, and, finally, experimental production of the disease by infections of tuberculin.

On Chronic Primal Dermatitis.—E. HEUSS, of Zürich (*Monatshefte f. prakt. Derm.*, July 1, 1899) describes a case of chronic dermatitis due to contact with primula obconica. A characteristic feature of dermatitis due to this plant is the suddenness of the attack, affecting usually the hands and face, with itching, swelling, redness, vesiculation, and papulation. The poisonous properties of the plant are due to fine hairs in the under surface of the leaves.

Suppurative Perifolliculitis and Frambœsiform Vegetations following Eczema.—HUBER (*Archiv für Dermatologie und Syphilis*, Band xlix., Heft 1) reports the following unusual complication of eczema: In a young girl, aged seventeen years, who had suffered from a severe, universal eczema for four years, an eruption of pea-sized, firm, perifollicular papules occurred on the anterior surface of both thighs and the mons veneris. A similar eruption existed upon the flexor surface of the left elbow. Upon the posterior surface of the thighs were coin to palm-sized, elevated, partly ulcerating, proliferating patches, formed by the confluence of numerous perifollicular lesions, these patches being polycyclic or oval in shape. The elementary lesion was a pustular perifolliculitis; through the coalescence of the pustular lesions and their ulceration frambœsiform vegetations arose. When left to themselves the vegetations possessed unlimited powers of increase, but if treated antiseptically they disappeared in a very brief period, leaving no trace. The author regards the complication as due to the invasion of pus-producing organisms in an individual predisposed thereto.

Erythromelalgia and Atrophy of the Skin.—SCHÜTZ (*Dermatologische Zeitschrift*, Band vi., Heft 3) reports a case in which the symptoms of erythromelalgia were combined with atrophy of the skin. The patient was a woman, aged forty-nine years, who had suffered much from malaria, acute articular rheumatism, and nervousness. The erythromelalgia came on gradually, affecting the left arm and hand, an exquisite venous redness gradually developing on these, accompanied by frequent attacks of severe, burning pain, especially after night. The burning was often associated with a dull pain on the inner side of the arm and swelling of the veins of the back of the hand. Besides the local symptoms there were headache, giddiness, buzzing in the head, accompanied at times by hardness of hearing. The general condition of the patient was bad. The skin of the back of the hand was wrinkled and shining, and it could be picked up in large folds. The author supposes a causal relationship between the two affections, the disturbance of nutrition caused by the erythromelalgia leading to disappearance of the tissues of the skin.

The Nature of Erythema Induratum.—THIBIERGE and RAVAUT (*Annales de Dermatologie et de Syphiligraphie*, 1899, No. 6) conclude, from a study of lesions taken from three cases of this affection, that it should be placed among the cutaneous tuberculoses, alongside of tuberculous gummata, with which it presents the greatest clinical affinities. Although tubercle bacilli were not found in sections of the lesions, the presence of vascular and inflammatory changes with giant-cells were sufficient, in the opinion of the authors, to make probable the tuberculous nature of the malady. In a guinea-pig inoculated with a fragment taken from one of the ulcerating lesions a typical experimental tuberculosis was produced, thus establishing the tuberculous origin of the disease.

PATHOLOGY AND BACTERIOLOGY.

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On Refractory Subcutaneous Abscesses Caused by a Fungus Possibly Related to the Sporotricha.—SCHENCK (*Johns Hopkins Hospital Bulletin*, December, 1898, No. 93) has isolated and studied a fungus pathogenic for man. During the latter part of August, 1896, the patient, a man, aged thirty-six years, suffering from chronic pulmonary tuberculosis, scratched the index finger of the right hand on a nail. Shortly after this a small abscess formed. When he came under observation, in November, 1896, there was an ulcer, with undermined edges, at the point of injury. The infection had extended up the arm, following the lymph channels, and giving rise to several circumscribed indurations, which were in part broken down and ulcerated. Upon incising these areas a quantity of gelatinous puriform material was found. The fungus was obtained in three cultures from two different foci of the disease—twice in pure culture and once admixed with the staphylococcus epidermidis albus.

The ulcer proved refractory to treatment, the last lesion, at the point of primary infection, persisting for six months.

The cultural characteristics of the organism were similar to those of many fungi and yeasts, but the exact classification could not be determined from the imperfect life-history. It grew well on the ordinary laboratory media. On agar the growth, at first white, became after a time of a dark brown color. Gelatin was slightly liquefied. Cover-glass preparations from agar and bouillon cultures showed two forms: (1) a thread-like branching form, or mycelium, and (2) oval, spore-like forms, or conidia.

The tissue removed for microscopical examination presented the characteristics of a chronic abscess. The sections failed to reveal any micro-organisms.

Experiments upon animals proved that the fungus was pathogenic. It was fatal for white mice. In dogs abscesses formed at the points of inoculation.

Concerning Epithelial Metamorphosis of the Thymus.—LOCHTE (*Centralblatt f. allg. Path. u. path. Anat.*, January 2, 1899, Band x., No. 1) has studied twenty cases of persistent thymus gland in the adult. Two cases were especially mentioned, a male, aged twenty-one years, who died of septic purpura, and a girl, aged eighteen years, dying of acute leukæmia.

In the first case the gland was composed of large epithelioid cells, with broad protoplasmic borders and large round or oval nuclei, lying in an alveolar connective tissue framework which presented few nuclei. In places the epithelioid cells were in close masses and more polyhedral in shape.

Occasionally they showed unmistakable transformation from connective tissue cells. In nearly every field a few very large epithelioid cells were observed, with two, three, or more nuclei, or with one very large nucleus. Between these masses of epithelioid cells were smaller collections of lymphoid cells and Hassal's bodies showing colloid degeneration. These changes were present in all parts of the gland.

The case of acute leukæmia showed in the thymus the same epithelioid cells, thickly crowded, and in places arranged in strands and bands. Between these were a few fragments of lymphatic tissue. There were no multinucleated or giant-cells present.

To find if any relation existed between these changes and acute blood diseases, seventy other glands were observed without finding similar transformations. A negative result was also obtained in cases of chronic leukæmia and pernicious anæmia. Therefore some such relation seems probable.

The origin of the cells is partly from the cells of the reticulum and partly from the endothelial cells lining its meshes. The presence of a persistent thymus needs a microscopical examination for certain identification.

Investigations of the Changes in the Peritoneal Epithelium during Inflammation.—BÜTTNER (*Beiträge z. path. Anat. u. allg. Path.*, 1899, xxv., 453) concludes that the endothelium takes no part in the union of serous surfaces whenever a preliminary adhesion is effected by the fibrinous exudate.

After aseptic suturing of two coils of intestine, the serous coats were soon found glued together by fibrin that was largely granular in character. Later proliferation of the connective tissue began. The cells directed themselves obliquely or perpendicularly toward the points of adhesion, and grew upward into the layer of fibrin. The proliferation, as determined by the appearance of mitotic figures, began at the end of the second day. After five days these spindle-shaped cellular elements had penetrated a thick fibrin layer, and the development of new vessels from the old tissues was demonstrable.

Early in the process of healing the form of the endothelial cells was altered by swelling of the nucleus and protoplasm. Desquamation was noted after twenty-four hours, and after three and a half days the endothelial lining had entirely disappeared, and only fragments of the cells were found in the fibrin.

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